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MESSAGE

OF

FRANCIS E. WARREN,

GOVERNOR,

TO THE

LEGISLATURE OF WYOMING.

NINTH ASSEMBLY

Wyoming [illegible]

1886.

LARAMIE, WYOMING
BOOMERANG PRINTING HOUSE
1886

Documents Division

GOVERNOR'S MESSAGE.

Gentlemen of the Council and House of Representatives:

In addressing you in person, I have the honor to conform to an established custom. Your attention is first directed to the annual reports of the Territorial officers, which are submitted in accordance with law, and contain full information in regard to the affairs of the Territory during the past two years.

The reports of the Auditor and Treasurer show the financial condition of the Territory to be highly satisfactory.

FINANCES.

Balance in Treasury Jan. 1, 1884.		$49,782.68
Receipts, 1884	$23,006.73	
Receipts, 1885	34,394.09	57,400.82
		$107,183.50
Expenditures, 1884 . . .	$37,992.06	
Expenditures, 1885	38,015.99	$76,008.05
Balance in Treasury Jan. 1, 1886		$31,175.45

The receipts were derived from the following sources:

Taxes for general fund, 1884	$19,029.59	
Taxes for stock indemnity fund, 1884	3,977.14	$23,006.73
Taxes for general fund, 1885 . . .	26,075.42	
Taxes for stock indemnity fund, 1885	8,318.67	34,394.09

The balance of $31,175.45 remaining on hand January 1, 1886, consists of $17,254.22 of the general fund, and $13,921.23 belonging to the stock indemnity fund. The last fund is derived from a special tax in the several counties on live stock only, and is used in paying for diseased animals killed under the direction of the Territorial Veterinarian. The policy of Wyoming has been to have no outstanding obligations.

The wealth of the Territory has steadily increased, having about trebled the past six years. In 1879 the assessed valuation was $10,603,203.95, while in 1885 it had increased to $30,717,249.81. None of the amounts given as assessed valuation represent more than one-third of the actual valuation of the property. The increased valuation the last year was about four and one-half million. The population during the same period has increased in equal ratio. The federal census of 1880 gave Wyoming a population of 20,789, and at the present time it can be safely approximated at 65,000. There has been a marked decrease in the rate of Territorial taxation during recent years In 1881 the rate was four mills on the dollar; in 1882, two mills; in 1883, one mill; in 1884, three-quarters of a mill; in 1885, one mill.

The total aggregate indebtedness of the several counties is $270,642.90, divided as follows: Albany, $52,119.63; Carbon, $79,925; Johnson, about $25,000; Sweetwater, $32,300; and Uinta, $81,298.27. Laramie county has a cash balance on hand of $49,667.83; Crook county nearly $5,000, and Fremont a little over $4 000.

PENITENTIARY COMMISSIONERS.

The Penitentiary Commissioners' report shows the number of Territorial prisoners remaining in confinement January 1, 1886, as follows:

State Penitentiary at Joliet, Illinois	69
State Penitentiary at Lincoln, Nebraska	9
Total	78

The discipline at the above prisons is reported to be thoroughly maintained, and the prisoners well provided for.

Forty-seven prisoners have been received from Wyoming during the past year. The cost of keeping and transporting convicts to the Penitentiary for 1884-1885 has been $10.204.09. This does not include the contingent expenses of the commissioners, which were $1.797.50. All prisoners are now sent to the State Penitentiary at Joliet, Illinois, and on delivery there are kept free of expense to the Territory, in exchange for their labor. The Territory, however, is required to furnish each prisoner five dollars on his discharge from the prison. Ten pardons were granted convicts the past two years, seven of which were issued by the late Governor William Hale, and three during the term of the present executive.

LAW LIBRARY.

The Territorial Library is a valuable acquisition as it is, but there should be a sufficient appropriation for the purchase of law books to bring it up to a proper standard. Many of the most valuable state reports are lacking, as well as common text books. We are now laying the foundation of the jurisprudence of this Territory, and it is therefore important that we have the very best aids obtainable. The sooner these reports are secured the better, for they will be as useful now as in the future.

SUPERINTENDENT OF PUBLIC INSTRUCTION.

The report of the Superintendent of Public Instruction shows a very satisfactory increase in the work of our public schools. The number of pupils enrolled in 1885 was 4,405, an increase of 1,053 over 1884. The total amount paid teachers in 1885 was $55,935.67, or an average of $58.06 per month each. The average cost per month of each pupil has been $4.14. Amount reported to have been paid for the erection of school houses, $13,075. Bonds for $20,000 have been issued during the past year for the erection of a new school house at Evanston, Uinta County. Your attention is called to the necessity of grading the salaries of county superintendents, which are now uniform throughout the Territory, but should be in proportion to time and labor expended. The salaries paid several of the county superintendents are very inadequate for the services rendered.

INSANE.

No class of unfortunates have more claim upon the bounty of our people than the insane. At the present time there are about twenty patients maintained by the several counties of the Territory, most of whom are confined in a private asylum at Jacksonville, Illinois. It would be far better if these patients could remain under the immediate charge of the Territory, instead of having to be transported more than a thousand miles from friends and home. The rapid growth of the Territory will soon necessitate the erection of an asylum, and even now on the grounds of economy, laying aside those of humanity, the building of such an institution would be money well expended. A building of this character would be an ornament where situated, and a credit to the Territory, through whose liberality it had been erected. It would not be necessary to complete the building, but erect a wing or such part of the structure as would meet our immediate wants. There should be extensive grounds, that the expense may be reduced by cultivating a tract of land, and furnishing employment to some of the inmates. All of the States and many of the Territories now have in operation hospitals for the insane, but they are generally over-crowded to an extent that does not admit of their receiving non-residents. The insane of Wyoming are confined in private asylums, without such advantages as could be afforded in a home institution.

COUNTY POOR.

An effort will probably be made by some of the counties to secure legislation for the erection of county poor houses. The policy of the eastern states in a majority of counties, respecting out-door relief, has been to reduce it, in amount, as much as possible; and it is generally observed where counties have erected suitable almshouses, the cost of the county poor has immediately and sensibly diminished. It is, however, impossible to require all who need temporary aid to go to the county poor farm. Such a rule would be both inhuman and unwise, for temporary assistance often saves a family from continual pauperism. This should be taken into consideration in any proposed legislation.

FISH CULTURE.

The work accomplished under the direction of Hon. Otto Gramm, Fish Commissioner, and set forth in his report, has been very satisfactory. During the past two years he has distributed within the Territory more than half a million of young fish, the product of the hatchery erected in 1884. By this means the Commissioner has been enabled to distribute the fish at a far less outlay than previous years. This industry, as it is conducted, is sure to prove highly successful and profitable. Similar enterprises are fostered by almost every State in the Union.

INSURANCE.

The report of the Insurance Commissioner furnishes a tabulated statement of the financial condition of forty-three fire insurance companies doing business in the Territory. The standing of life insurance companies, mutual benefit assessment companies and societies, is not given, for the reason that our insurance laws do not require such statements to be made. The commissioner recommends that the law be amended so as to compel all life insurance companies to report the same as fire companies.

BANKS.

Banks and banking institutions are a necessity to the business of a community, and it is important that the laws provide ample protection to the people who transact business and deposit their savings with these institutions. National banks are required by the national banking laws to publish sworn statements at stated intervals, that the public may be advised of their financial condition. Private banks in some states are also directed to make like reports to the supervisor. No good reasons occur to me why Wyoming should not adopt similar laws governing private banking institutions.

RAILROADS.

Wyoming needs more railroads. All conservative legislation to encourage their building will be a benefit to the Territory. The prosperous western states of to-day, Colorado, Kansas, Nebraska and others furnish sufficient proof of this. The history of their early endeavors and investments, and the success that attended the outlay, furnish food for intelligent thought upon the matter, and I invite your attention to the subject. Railroads and their relation to the public should receive careful attention. In no way can our vast resources be more rapidly developed than by the extension of railroads throughout the Territory. While these roads should be subject to wholesome legislation and the same restrictions as other taxpayers, a policy should be pursued that will induce the expenditure within our borders of millions of capital seeking investment, as well as encourage thousands of new comers to seek homes in our Territory. It must be borne in mind that railroads are taxable and fixed property, seldom removed, and that they furnish a productive and constant source of revenue.

MINES AND MINING.

While the Territory has many and varied resources, none contain greater promise for the future than its undeveloped mineral possessions. Very much has been accomplished since the adjournment of the last Legislature in the way of prospecting and partial development, and the work done in this direction demonstrates that Wyoming will at no distant day become more noted for her mineral productions than for any of her industries, not excepting her present leading industry of stock raising. Coal has been largely and profitably mined before and since our Territorial organization, but the development of other minerals may be said to have scarcely begun. Nevertheless enough has been learned to establish the fact that we have mountains of iron, copper, mica and sulphur, vast lakes of soda, immense tracts of coal and petroleum, together with the precious metals, and many of the baser metals not here enumerated. The Territorial Geologist has applied himself industriously in exploring and testing our mineral resources, and the results of his labor have been embodied in a comprehensive report, which I take pleasure in placing before you. I bespeak for it your earnest attention. Increased railroad facilities will do much for our mining interests, and favorable legislation can greatly aid it. There should be a sufficient sum appropriated to continue the encouragement of this important industry. Your attention is also called to the necessity of providing by law suitable protection for the miners against dangers arising from improper ventilation, insufficient timbering, want of escapement shafts, and other accidents incident to mining under ground.

LIVE STOCK.

It is assumed that the stock laws will require some revision, as every two years produce necessarily new conditions; and I beg to express the hope that the same fostering care that has marked past legislation shall be exercised in the future regarding this industry. It is hoped that no prejudice against large owners, personal or corporate, will be entertained to their disadvantage, nor on the other hand should the rights and privileges of small owners be disregarded in any degree by legislation favorable to the larger stock-growers. Live stock raising was the first important industry to attract the attention of the world to Wyoming. It has aided in a great degree our Territorial development and contributed a large proportion of our taxes. The open range system of stock raising must of necessity gradually recede from our more fertile districts, as agriculture receives deserved attention and invites larger investments. Our laws should be so framed as to recognize and protect each in its proper relation—live stock on ranges, in pasture and stables, or joined with agricultural pursuits.

TERRITORIAL VETERINARIAN.

Your attention is directed to the report of the Veterinarian, which gives the number of cattle submitted to quarantine regulations during the past summer; also the number of horses killed on account of disease. At the present time there exists no disease among the cattle and horses of this Territory.

The law regulating the branding of cattle gives to the brand committee of each county the power to record any brand which does not conflict with the brands on record within that county. Frequently, parties in different counties adopt the same brand, and in order to avoid the difficulties arising from this cause I recommend that the matter of passing upon the brands throughout the entire Territory be under the direction of a single department as in Montana.

PRAIRIE FIRES.

The County Commissioners should have the power to cause to be plowed and burned on both sides of every laid out and traveled road or railroad, a sufficient space to prevent prairie fires from crossing the land so plowed and burned. Doubtless railroad companies should be compelled to provide fire-guards at their own expense along their lines. where there is sufficient grass to endanger the surrounding ranges. It would perhaps work a hardship if the entire line of a railroad was subject to this regulation. But in dangerous localities this fire-guard should be insisted upon. The law should also impose penalties where parties either intentionally or carelessly set fire to the prairie.

WIDTH OF COUNTY ROADS.

There has been much complaint concerning the narrowness of highways for the passage of cattle, horses and other live stock. and this evil will increase as the country becomes more thickly settled. unless relief is afforded. Under existing statutes the County Commissioners can only reserve eighty feet in width when laying out county roads. and our law contains no provision for establishing Territorial highways. It would undoubtedly be a great advantage to the public if the power of the County Commissioners was increased so that in some instances highways of at least five hundred feet in width could be designated. With the co-operation of the several counties, this would enable the Commissioners to lay out a system of broad highways within the Territory that would admit of free and uninterrupted trade between the principal points of business, the open stock ranges and points of shipment upon railroads. Perhaps Territorial highways of this character could be provided by legislation. Every one familiar with the handling of live stock in our Territory will admit the great necessity of keeping open roads of sufficient width to accommodate the movements of large bodies of live stock. I earnestly recommend suitable legislation on this subject.

COUNTY COMMISSIONERS.

The affairs of the counties would unquestionably be better administered if the tenure of office of the County Commissioners was changed, so as to admit of only one or two Commissioners retiring from office at the same time. By this arrangemement there would always be at least one Commissioner whose experience and knowledge of county affairs would be available to the other members of the board.

ASSESSMENT, LEVY AND COLLECTION OF TERRITORIAL AND COUNTY REVENUE.

The county assessors in the more populous counties experience considerable difficulty in being obliged to make up their assessment rolls within the limited time allowed by law; and the County Commissioners and County Clerk are not given enough time to perform the work of equalization. The Territorial Board of Equalization, by an act passed in 1869, are required to convene on the fourth Monday of July, to equalize the Territorial taxes, and by a further act, passed in 1879, to meet on the first Monday of August as a board of assessment of railroad and telegraph lines. It has been the custom of the board to adjourn until the latter day, but a slight amendment in the law would enable the board to perform both duties on the last mentioned date, and at the same time afford the County Commissioners and County Clerk a longer time in which to prepare their returns.

In this connection I wish to call your attention to the law in regard to paying poll tax, which, though provided for upon our statutes, is not properly enforced. The collection of this tax is devoted to the school fund of our Territory, and in all cases should be insisted upon. As a matter of fact not one-third of those who vote pay the poll tax required by law.

ATTORNEY GENERAL.

There are occasions constantly arising when the advice of an Attorney General would be of great value to the Territory. At the request of the Governor it would be his duty to prosecute any official bond or contract in which the

Territory is interested. When required he would give his opinion in writing without fee, upon all questions of law submitted to him by the Legislature, or by the Governor, Auditor, Treasurer, or other Territorial officers, relating to their official duties. He might be required to advise with the County Attorneys, when requested by them, in all matters pertaining to their official duties, and would be expected to prepare proper drafts of contracts, forms or other writings, which may be needed for the use of the Territory. The Attorney General would examine from time to time the official bonds of officers, to determine as to the sufficiency of their sureties, which may be affected by the death or insolvency of bondsmen.

JURIES.

I am informed by members of the bar that the jury law passed by the last general assembly, though open to some criticism, is generally conceded to be a marked improvement upon the old jury system. Where the County Commissioners are careful in selecting the list to be drawn from, there is little delay in securing a competent jury. It is somewhat more expensive than the old system, for the reason that the regular panel is composed of twenty-four members, many of whom come from a distance; but this additional expense is more than compensated for by the improved service. I understand that this subject has received the careful consideration of the gentlemen who compose the compilation committee, and I respectfully call your attention to their recommendations upon this subject.

THE JUDICIARY.

The bill for the appointment of four judges in the Territory instead of three, as at present, was defeated in Congress last winter. There are many reasons why our Territory would be greatly benefitted by the appointment of another associate justice. A provision which would allow appeals to be tried by three judges, neither of whom had heard the case below, would be satisfactory to litigants. There is a feeling now that the case is pre-judged in a measure by the justice who has heard the case before appeal. The creation of new counties, and consequent increase of population and business, is already sufficient to employ the services of an additional judge. This subject can properly be brought to the attention of Congress by a suitable memorial.

COMPILATION AND REVISION OF THE LAWS.

The report of the commission to revise and compile the laws is now submitted to your honorable body, and I trust will receive your approval. The character and high professional standing of the gentlemen appointed two years ago to do this work was a sufficient guarantee that it would be faithfully performed.

PUBLIC LANDS.

The United States land laws in relation to acquiring title to public lands were made in view of settling up the more fertile prairie states, and when applied to our mountain regions where crops cannot be raised without artificial irrigation, work great hardship and injustice to actual settlers. In the Mississippi and Missouri valleys there is a plentiful fall of rain, and 160 acres located in almost any part of that section is generally regarded sufficient for a fine farm; but in Wyoming, leaving out a very limited area of land along the streams, 160 acres would scarcely support five full grown domestic animals. Under the land laws and regulations of the department, our citizens have been held to the same rulings as the more fortunate settlers in the western states, and compelled to pay the same price for inferior lands. Bills have been introduced in Congress which, if passed, will repeal the desert land laws, depriving us of the advantages conferred by this act, and also repeal the preemption and timber culture acts. If those who legislate upon this subject, and the department having control of the public lands, could acquire by personal observation a more thorough knowledge of the character of the land in this and adjoining States and Territories, it is my opinion that there would be a more liberal policy in dealing with the people of this arid region. I recommend that the whole subject be fully deliberated upon by you and a strong memorial sent to Congress.

INDIAN RESERVATIONS.

The honorable Secretary of the Interior, in his last annual report to Congress, favors the cutting down of Indian reservations by giving lands in severalty to the Indians, 320 acres each, selling the surplus lands and investing the proceeds for the benefit of the several tribes. General Sheridan also in his report advocates the same plan, and states that the Shoshone Indians, on the Wind River reservation, under this arrangement would have surplus land amounting to 2,500,000 acres. If this was thrown open to settlers the Indians would derive, at four per cent. interest, an annual income of $117,000 on the proceeds of the sale.

IRRIGATION.

Perhaps no interest in our Territory has developed more rapidly of late than the reclaiming of desert lands for agricultural purposes. The surrounding States and Territories have ample laws for the protection of individual and corporate rights in the use of streams for irrigation. As this branch of industry advances in our Territory, annoying and expensive litigation will surely follow, unless comprehensive legislation shall define the rights and privileges of those who are compelled to use water for irrigating. There is at present no public record of the location of ditches, except perhaps where companies have filed their incorporation papers, and the priority of individuals or private companies can in no way be substantiated by any existing registry. I urgently recommend that this subject receive your early and full consideration.

MANUFACTORIES.

Manufactories, which are desirable and necessary in the growth and development of a new country, are largely dependent upon water, and have a vital interest in the laws governing its distribution and priority of ownership. This is especially true regarding the large irrigating canals now in course of construction, upon which will be located large farming interests, towns and villages.

AGRICULTURE AND COUNTY FAIRS.

Agriculture, which employs more than one-half of the industrial element of the population of the country, and has contributed more than any other industry to the settlement, development and material prosperity of the west, is destined to become one of the most important factors in our advancement. Already the more fertile valleys of our Territory are being settled up with thrifty farmers, and their success has demonstrated that our soil and productions will compare favorably with those of any of the northwestern States and Territories. It is the duty of the legislature, in every practicable way, to encourage the interest of agriculture by promoting immigration, and by enacting wise measures for the reclamation of desert lands by irrigation. Agriculture *must* depend in this Territory upon *irrigation.*

The Legislature should also extend aid to county associations for promoting the interest of agriculture, and especially should stock fairs be encouraged by offering premiums, as this is essentially a stock producing Territory. Johnson County enjoys the distinction of having held the first county fair in Wyoming, and I indulge the hope that every county may follow her example.

CHINESE.

Wyoming, within the past five months, has achieved an unenviable notoriety on account of an unlawful assault made upon the Chinese miners at Rock Springs. The inhuman and heartless attack on the part of the white miners showed such an utter disregard of all moral and civil laws that it deservedly received the severest condemnation throughout the country. There was a general feeling that the Chinese had been grossly outraged, as they were entitled, under existing treaties between China and the United States, to the same protection to life and property as any other class of foreigners. Under any state of affairs the white miners were not justified in murdering their helpless victims. It must be admitted that there exists between the Caucasian and Mongolian races prejudices, whether natural or acquired I cannot state, that have on more than one occasion caused serious trouble. The Chinese do not assimilate with our people, and therefore are not to be regarded as a desirable element in our civilization. The laws passed by Congress restricting Chinese immigration was in response to an almost unanimous sentiment on the part of the people of the Pacific States and Territories to have the Chinese excluded from the country. The same sentiments, I believe, are shared by our people, and therefore it is their desire to see the laws fully enforced.

THE ENFORCEMENT OF THE LAW.

The recent troubles at the mines in Rock Springs has convinced me that there should be some further provision in our statutes relating to the enforcement of the law. It is the duty of the Governor to see that the laws are faithfully executed, and he is authorized to use all the power at his command to insure obedience to the law. But it has been demonstrated that when any serious difficulty occurs the county and precinct officers need assistance to maintain order. The power of the executive would be greatly strengthened if provision was made for an organized Territorial force.

MILITIA.

Many of the Western States are manifesting an increased interest in their militia by organizing and uniforming new companies, and placing them on a permanent basis. The necessity of having a disciplined and well armed militia is fully recognized, and we should not be behind in this matter. A moderate encouragement given to the formation of military companies would have the effect to stimulate the zeal and martial spirit which exists in our community. It would enable Wyoming to obtain the arms and ordnance granted by the Federal Government in cases where there are organized commands. Some of the societies that are now under drill, it is believed, would furnish valuable material in organizing a competent force.

ELECTIONS.

The law providing for the election of members of the Legislative Assembly needs important amendments. Under its provision the election occurs more than a year before the meeting of the Legislature; and in some instances members have become non-residents of the Territory before the convening of the general assembly, and there are liable to be vacancies caused by death. The counties, in cases of death or removal, are involved in the expense of a special election. In order to elect members to the Legislature within a few months of the time of assembling, and preserve at the same time the present arrangement of bi-annual elections, it will be necessary to change the date of meeting from even to odd years, and an interval must elapse of either one or three years between the meeting of the present Legislature and the next.

An increase in the membership of both branches of the general assembly would be an advantage, owing to our rapidly increasing population, and the difficulty of apportioning satisfactorily thirty-six members over such a wide area of Territory. I also suggest that there might, perhaps, be some benefit in paying a specific sum for the Legislative term instead of a per diem. To effect the changes alluded to it will be necessary to invoke the aid of Congress.

The law which requires a separate ballot to be cast for Probate Judge and County Treasurer, should be amended so that one ballot will include both offices, the same as County Clerk and Ex-Officio Register of Deeds. It was no doubt the intention that these two offices should be held by the same person, but owing to a defect in the law the people of Crook County are in the anomalous position of having elected Hon. M. W. Pettigrew County Treasurer and Hon. J. P. Gammon Probate Judge. The election contest between these gentlemen will be brought to your attention.

REGISTRATION.

While we are proud to share our citizenship with our wives and mothers, we have no registry law by which the ballot box can be protected from the corrupting influences of illegal voting. I call your serious attention to the necessity of enacting some law whereby this evil can be overcome.

NOTARIES.

Under the existing laws Notaries Public are obliged to go to the county seats in order to properly qualify before the County Clerk. The lack of railroad accommodations in many localities involves considerable expense and loss of time, all of which could be saved if the law was so amended as to admit of qualifying before a Justice of the Peace or other officer authorized to administer oaths.

POWER TO CONDEMN PROPERTY FOR PUBLIC USES.

The Territorial, County and Municipal authorities ought to have the right conferred upon them by law to purchase by condemnation convenient sites for public buildings and other purposes, without being compelled to pay exhorbitant prices, and yet with such safeguards as would secure to the owner of the property condemned the full value. The law could be made applicable to all property needed for public uses.

PUBLIC BUILDINGS.

Every State and Territory, provides sooner or later, suitable buildings for public use. While it might seem extravagant to make lavish appropriations now for the construction of such buildings, reasonable prudence and economy would provide a proper place for the public records and the Territorial library. At present the public offices are widely distributed, and are liable to be destroyed by fire at any time. The amount now paid for rent of the various public offices would pay a liberal income on a moderate investment. The Territorial library contains some ten thousand volumes, and should have more permanent quarters. It would afford greater convenience to the public if the various Territorial offices could be brought together in a central location, and the same reasons can be urged in favor of the Federal offices and the Supreme Court, which are provided with poor and insufficient accommodations. The rents now paid by the general Government would go far towards maintaining such a building. New Mexico has extensive public buildings, and Idaho has recently expended $150,000 in the construction of public buildings for the use of the Legislative, Federal and Territorial officials, and the Secretary of the Interior in his last annual report to Congress recommends that the Territory be reimbursed by the Federal Government for the amount expended.

In considering this quesion I wish to call your attention to the fact that the ordinary expense of running the Territory are only a trifle more than they were ten years ago, while the wealth and population has more than trebled. This is shown by the rate of taxation, which is only a fraction of what it was a few years since. No one will dispute the wisdom of keeping the ordinary expenses of conducting public business at as low a figure as is compatible with good service; but in the case of expenditures for public improvements it is to be regarded as an investment for which the people have something to show in the nature of assets—not to be counted as a loss, but an available resource. It is better for the Territory to own property than be compelled to pay a high rate of interest for the use of it.

EXPOSITIONS.

The exhibit which reflected so much credit upon our Territory at the Denver Exposition in 1882-3, received valuable additions through the efforts of Hon. Homer Merrill, Commissioner, and Dr. George C. Rafter, Alternate Commissioner, and was exhibited at the World's Exposition held at New Orleans in 1884. This exhibit now forms part of the North, Central and South American Exposition, at the same place. It is conceded that these Expositions are of great value in bringing the resources of our country before the world, and the great benefit derived from them is incalculable. Numerous letters and circulars concerning the American Exhibition, London, 1886, have been received at the executive office during the past year, and the management have requested that Wyoming make an appropriation for a Territorial exhibit. This correspondence will be placed at your disposal. There is some unsettled business connected with the Denver Exposition, to which your attention will be called by the Auditor.

YELLOWSTONE NATIONAL PARK.

It is a source of pride to the people of Wyoming that this great National Park, with its senic wonders and beauties, is within our borders, and it is their desire that it be afforded every protection of the law. Your attention is directed to the remarks of the Secretary of the Interior in relation to the Park, contained in his report for 1885. I have addressed a communication to the Honorable Secretary on this subject, and will be pleased to submit to you at an early day the result of this correspondence.

IMMIGRATION.

At no time in the history of Wyoming were inquiries more frequent than during the past year for reliable information as to the advantages offered to settlers within our borders. Every inducement should be held out to those desiring to cast their fortunes with us. The Government does much to encourage actual settlers on the public domain, and the Legislature can forward this work greatly by the appointment of a Commissioner of Immigration, or by placing the matter under the immediate supervision of some Territorial officer, whose duty it will be to give all information relating to our varied resources. The executive office receives many inquiries, sometimes aggregating a score or more in a single mail. The only document that can be furnished at present is the Governor's annual report, while a large number of these applications require special answers by letter.

UNIVERSITY LANDS.

The common school system is more valuable to a growing community than the higher institutions of learning. The time, however, is rapidly approaching when both will be necessary to secure the best results in our educational system. Under a provision of the United States statutes, seventy-two sections of the public lands are placed to our credit for university purposes, the proceeds of which can be devoted to founding an institution for higher education when the Territory becomes a State. These lands have not been designated, and I earnestly recommend that an appropriation be made sufficient to provide for defraying the expense of a commission in selecting these lands. Locations should be made by competent men, who will go into the field to examine each tract. The Secretary of the Interior suggested nearly three years ago that the selection be made under the supervision of the Superintendent of Public Instruction. The land must be located under authority of the Interior Department, but can be arranged for if the necessary funds are provided by the Legislature to defray expenses of selection. The sooner these lands are chosen the more valuable they will be, as choice locations are being rapidly filed upon by settlers.

SCHOOL LANDS.

Sections 16 and 36 in each township of the public domain are school lands, and become the property of a State when admitted, but are not available to the Territory. I recommend a memorial to Congress asking that the Territory may obtain immediate control of these lands, as well as the university lands, to sell or lease, thereby aiding our schools while they are in their infancy and most in need of assistance. The memorial should also ask that barren school sections be exchanged for fertile ones in justice to this Territory, which has so much nearly worthless land. In the more fertile States all school sections are located upon valuable land.

DEAF AND DUMB.

In nearly all of the States the law requires that the deaf and dumb be furnished an education. They are entitled to our tender sympathies. This education not only implies the ability to communicate their thoughts by sighs and in writing, but they are successfully taught some useful trade, so that they may become self-supporting. Your most favorable attention is directed to the report of Mr. De Coursey French, which is herewith submitted. He reports some fifteen or more of this unfortunate class in the Territory, and suggests the opening of a school. The deaf and dumb belong to the defective classes, and therefore deserve your kind consideration.

SELLING LIQUOR TO MINORS AND DRUNKARDS; GAMBLING AND SUNDAY LAWS.

There should be stringent laws punishing those who sell intoxicating liquors to minors, or to any person who is in the habit of being intoxicated, after proper notice has been given that such person is an habitual drunkard.

Restrictions on gambling, and a proper observance of Sunday are also questions deserving your thoughtful consideration. It is important that in our struggle for material advancement we do not overlook the moral improvement of the citizen.

PUBLIC DOCUMENTS.

The increasing demand for public documents makes it important that the Legislature should order printed at least 500 copies of the combined reports of the various Territorial officers for distribution and exchange with other States and Territories. I suggest that in the case of the Auditor's and Geologist's reports that an additional 500 of each be printed, for the reason that these reports are in demand, and furnish valuable information in regard to our financial standing and natural resources to those wishing to invest or locate in the Territory.

The annual report of the Governor to the Secretary of the Interior, for 1885, is now being printed at Washington, and I hope to be able to place it at your command at an early date. Many of the subjects briefly mentioned in this address are more fully treated in the annual report, and I invite your attention to its contents.

HASTY LEGISLATION.

The executive is a co-worker with the Legislature in all its labors. He approves such bills as in his judgment should become laws, and returns those which he cannot conscientiously sign, transmitting with the bill his reasons for vetoing the same. It is desirable that this be done in all cases as early as possible, in order that you may introduce the subject matter of the bill, less the objectionable features, in another enactment, or secure the passage of the original bill by the constitutional two-thirds vote. I trust that it needs no argument to sustain the proposition that it is impossible for the executive to properly perform his duties in this regard, unless sufficient time is allowed to thoroughly scrutinize and consider every act of legislation. Let me urge, therefore, that you do not crowd into the last few days of the session, as often occurs in Legislative bodies in Wyoming and elsewhere, the most important and a large proportion of the unimportant legislation. It may be claimed that it is within the power of the Governor to inform himself from day to day of the intent of the bills before the Legislature, through the printed copies and other sources of available information, and that he will therefore be prepared to pass upon the bills when presented to him. But frequently a slight change by amendment makes it an entirely different measure, requiring another course of thought and study. The executive cannot justly be criticised when his signature is withheld from bills not presented in season to permit of proper examination. This fact, coupled with the accepted truth that hasty legislation should be avoided, furnishes every reason why the early days of your session ought to be the busiest, and should be fully improved by the early introduction and consideration of important matters.

IN CONCLUSION.

It is my earnest desire to co-operate with the Legislature in all measures beneficial to our Territory. Permit me to express the hope that our intercourse in all official and personal relations may be frank and cordial.

You are to be congratulated upon the outlook of our territory, and the auspices under which you have assembled. I trust when you have finished your labors the result will be satisfactory to yourselves, and the constituency whom you have the honor to represent.

FRANCIS E. WARREN.

EXECUTIVE DEPARTMENT, Cheyenne, Wyo., Jan. 18, 1886.

APPENDIX.

REPORT OF TERRITORIAL AUDITOR

For the Years 1884 and 1885.

TERRITORY OF WYOMING,
OFFICE OF THE AUDITOR OF PUBLIC ACCOUNTS,
JANUARY 9, 1886.

To His Excellency, Francis E. Warren, Governor of Wyoming:

SIR:—In compliance with law, I have the honor to submit the report of this office, showing the transactions of this department for the two years commencing January 1, 1884, to and including December 31, 1885:

Balance in the Treasury, December 31, 1883	$41,091 25	
Receipts to December 31, 1885	50,417 40	$91,508 65
Disbursements to December 31, 1885		$76,213 89
Balance in the Treasury December 31, 1885		$15,294 76

Statements in detail and incidental to the above follow in their regular order.

STATEMENT NO. I.

Showing the balance of each fund remaining in the Territorial Treasury December 31, 1883, the receipts and disbursements to December 31, 1885, inclusive, and the balance remaining in the Territorial Treasury at the close of business December 31, 1885.

Balance in the Treasury, Dec 31, 1883.	Receipts to Dec 31, 1885	NAME OF FUND.	Disbursem'ts to Dec. 31, 1885.	Balance in the Treasury Dec. 31, 1885.
$34,690.70	$41,618.13	General	$71,438.76	$ 4,870.07
6,400.55	8,799.27	Stock Indemnity	4,775.13	10,424.69
$41,091.25	$50,417.40		$76,213.89	$15,294 76

STATEMENT NO. II.

Detailed statement showing the receipts and disbursements of the Territorial Treasury from December 31, 1883, to and including December 31, 1885:

GENERAL FUND.

RECEIPTS.

Balance in the Treasury, December 31, 1883			$34,690 70

1884.

Territorial tax collected, assessment for 1883 . .		$15,145 19	
Albany County	$3,602 18		
Carbon County	3,662 37		
Johnson County	2,890 86		
Laramie County	967 08		
Sweetwater County	2,547 70		
Uinta County	1,575 00		
Fees collected.		758 50	
From Territorial Auditor, Insurance Department	741 00		
From justice of the peace, fines in Yellowstone National Park . .	7 50		
Amount of forfeited bond received from Laramie County in the case of Territory of Wyoming vs. Knowlton and Gray		1,000 00	
Total receipts for 1884			$16,903.69

1885.

Territorial tax collected, assessment for 1884		$18,463 29	
Albany County	$3,246 21		
Carbon County	3,002 29		
Fremont County	1,275 36		
Johnson County	2,510 86		
Laramie County	6,283 86		
Uinta County	1,659 50		
* Uinta County, for 1883	485 21		
Weights and Measures—general fund		609 00	
Albany County	378 00		
Carbon County	230 00		
Fees collected		66 25	
From justice of the peace, fines in Yellowstone National Park	66 25		
Error in drawing warrant No. 159		20	
Delinquent taxes collected		75 70	
Laramie County—for the year 1877	11 55		
" " for the year 1878	8 81		
" " for the year 1879	16 58		
" " for the year 1880	19 06		
" " for the year 1881	19 70		
Territorial taxes collected, assessment for 1885. Laramie County		5,500 00	
Total receipts for 1885			$24,714 44
Total			$76,308 83

DISBURSEMENTS.

		$71,438 73
Total amount of warrants drawn	$71,289 20	
Stock indemnity fund tax received from Sweetwater County, for 1884, was credited to this fund—it has since been charged to this fund and credited to Stock Indemnity fund	149 56	
Balance in the Treasury December 31, 1885		$4,870 07

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* This amount was received by the Treasurer January 14, 1884. The Treasurer of Uinta County did not forward the voucher to this office until March 5, 1885, when Uinta County was credited and the Territorial Treasurer charged with the amount.

STOCK INDEMNITY FUND.

RECEIPTS.

Balance in the Treasury December 31, 1883			$ 6,400 55

1884.

Amount refunded by Honorable Jesse Knight, Territorial Auditor, January 15, 1884, being an error in auditing vouchers Nos. 292, 293 and 294		$ 15 00	
Total tax collected, assessment for 1883		7,284 27	
Albany County	$ 971 44		
Carbon County	1,271 59		
Fremont County	785 72		
Johnson County	1,507 29		
Laramie County	2,371 00		
Sweetwater County	149 56		
Uinta County	227 67		

1885.

Total tax collected, assessment for 1884		1,500 00	
Laramie County			
Total receipts for 1884 and 1885			8,799 27
Total			$15,199 82

TOTAL DISBURSEMENTS.

Total amount of warrants drawn	$ 4,775 13
Balance in the Treasury December 31, 1885	$10,424 69

STATEMENT NO. III.

Reconciliation of the Accounts of the Auditor and Treasurer.

GENERAL FUND.

Balance in Treasury December 31, 1885, as shown by Auditor's books			$ 4,870 07
Warrants drawn by the Auditor not yet presented to the Treasurer			672 51
Warrant No. 345, Committee to settle with Auditor and Treasurer		$ 28 00	
Warrant No. 582, keep and transport of prisoners		267 25	
Warrant No. 602, Fish Com'n contingent	$20 00	135 60	
Warrant No. 603, " "	75 00		
Warrant No. 604, " "	23 60		
Warrant No. 605, " "	17 00		

Warrant No. 606, Yellowstone National Park Salaries and Fees	33.33	91.66	
Warrant No. 607, Yellowstone National Park Salaries and Fees	33.33		
Warrant No. 608, Yellowstone National Park Salaries and Fees	25.00		
Warrant No. 617, Stenographer's Salary.		150.00	
Receipts by Treasurer for which his duplicate vouchers have not yet been forwarded to this office by the persons to whom they were issued			11,711.64
Albany County, Tax 1885		4,197.81	
Johnson County, Tax 1885............		3,500.00	
Sweetwater County, Tax 1885		2,421.33	
Crook County, Tax 1885....		1,500.00	
Yellowstone National Park Fund, fees collected by justice of the peace		92.50	
Total in Treasury, according to Treasurer's books		....	17,254.22

STOCK INDEMNITY FUND.

Balance in the Treasury December 31, 1885, as shown by Auditor's Books		10,424.69
Receipts by the Treasurer for which his duplicate vouchers have not yet been forwarded to this office............		3,496.54
Albany County, Tax 1885....................	892.39	
Johnson County, ...	1,500.00	
Crook County, ...	850.00	
Sweetwater County, ...	254.15	
Total in Treasury according to Treasurer's books....... ...		13,921.23

RECAPITULATION.

Total amount in Treasury December 31, 1885, as shown by the Treasurer's books:		
General Fund.	17,254.22	
Stock Indemnity Fund	13,921.23	
Total....		31,175.45

STATEMENT NO. IV.

Showing the amounts of unexpended balances December 31, 1883, of the appropriations made by the Seventh Legislative Assembly for the two fiscal years next ensuing after March 31, 1882, the amounts of warrants drawn against said balances, and the unexpended balances March 31, 1885:

NAME OF ACCOUNT.	Balance December 31, 1883.	Amount of Warrants Drawn.	Balance March 31, 1885.
Prisoners keep and transport	6,014 28	2,990 10	3,024 18
Salaries—Auditor	333.34	333 34	
" Treasurer	100 00	100 00	
" Veterinarian	1,041 71	833 33	208 38
" Geologist and Mining Engineer	1,287 50	750 00	537 50
" Librarian	400 00	400 00	
" Stenographer	984 00	375 00	609 00
" Judges	500 00	473 60	26 40
Contingent—Secretary	25		25
" Auditor	94 15	94 15	
" Veterinarian	1,380 59	129 73	1,250 86
" Fish Commission	93 16	92 50	66
" Penitentiary Commission	271 60	271 60	
" Librarian	803 06	516 67	286 39
" Weights and Measures	74 59		74 59
Supreme Court—Clerk's Office Conting't	331 95	24 25	307 70
" Publication of Reports	400 00	350 00	50 00
Mileage—Stenographer	251 80	126 60	125 20
Commissions—Treasurer	570 04	281 09	288 95
Auditor and Treasurer—Settling with	313 70		313 70
Teachers' Institute Expenses	672 81		672 81
Insurance—Territorial Library	21 44		21 44
Ordnance—Care and transportation of	33 34	33 34	
Ad Interim Expenses	115 97		115 97
R. E. Strahorn	14 10		14 10
Block of Marble Washington Monument	188 66	188 66	
Territorial Seal	34 00		34 00
	16,326 04	8,363 96	7,962 08

By order of the committee appointed by the Eighth Legislative Assembly to settle with the Auditor and Treasurer, the unexpended balances in the above accounts, March 31, 1885, and the balances in the following accounts:

Laramie County	$ 03
Delinquent Taxes	350 84
Were converted into the General Fund, March 31, 1885.	
Total converted into the General Fund above is	8,312 95

STATEMENT NO. V.

Showing the appropriations as made by the Eighth Legislative Assembly of the Territory of Wyoming, to whom and for what purpose appropriated, the amount of warrants drawn against the same, and the unexpended balances to and including December 31, 1885.

Prisoners keep and transporting	$18,000 00	$10,205 69	7,794 31
Salaries—Auditor	2,000 00	1,750 00	250 00
Treasurer	800 00	700 00	100 00
Veterinarian	5,000 00	4,375 00	625 00
Geologist and Mining Engineer	3,000 00	2,562 50	437 50
Fish Commissioner	600 00	450 00	150 00
Librarian	1,600 00	1,200 00	400 00
Stenographer	3,600 00	3,150 00	450 00
Superintendent of Weights and Measures	200 00	100 00	100 00
Contingents—Governor	2,000 00	2,000 00	
Secretary	1,000 00	982 01	17 99
Auditor	400 00	345 93	54 07
Treasurer	400 00	382 75	17 25
Veterinarian	3,000 00	3,000 00	
Geologist and Mining Eng.	1,000 00	1,000 00	
Fish Commission	2,000 00	1,919 77	80 23
Penitentiary Commission	2,500 00	1,798 30	701 70
Insurance Commissioner	600 00	254 89	345 11
Superintend't of Weights and Measures	300 00	228 30	71 70
Supreme Court, Clerk's Office	800 00	664 85	135 15
Library Rent and—— . .	3,000 00	2,014 63	985 37
Mileage—Stenographer	1,000 00	689 80	310 20
Library—Insurance and Purchase . . .	1,000 00	726 14	273 86
Commissions—Treasurer	1,700 00	996 62	703 38
Auditor and Treasurer—Committee to Settle with	800 00	576 20	223 80
Teachers—Institute Expenses	1,500 00	1,238 08	261 92
Reports—Distribution Supreme Court .	100 00	98 00	2 00
Yellowstone National Park—			
Salaries and Fees in criminal cases . .	8,000 00	6,971 42	1,028 58
Telegrams relating to	500 00	155 91	344 09
Printing Laws relating to	250 00	173 80	76 20
Ordnance—Care and transportation of .	400 00	244 50	155 50
Printing—Session Laws, 1879	700 00	388 10	311 90
School, Election, Stock and Irrigation Laws	500 00	481 90	18 10
Governor's Message and Territorial Officer's Reports . .	350 00	332 00	18 00
Amount forward	68,600 00	52,157 09	16,442 91

STATEMENT NO. V.—Continued.

NAME OF ACCOUNT.	Amount of Appropriations.	Amount of Warrants Drawn.	Balance December 31, 1885.
Brought forward	68,600 00	52,157 09	16,442 91
Commission to Revise Statutes—			
Salary of	3,600 00	3,600 00	
Salary of Clerk of	800 00	800 00	
Stationery for	100 00	99 50	50
Election Returns—Messenger for . . .	500 00		500 00
Hatching House—Building of Fish . . .	500 00	496 60	3.40
Relief—Stirling Birmingham	122 67	122 67	
E. S. N. Morgan	38 70	38 70	
Laramie County	1,000 00	1,000 00	
J. M. Lobban	147 09	147 09	
Mike Murphy	100 00	100 00	
Eighth Legislative Assembly—			
Contingent Expenses	591 79	552 99	38 80
Rent of Rooms	100 00	100 00	
Pay of Officers	2,420 00	2,420 00	
Totals	78,620 25	61,634 64	16,985 61

* The balance remaining in this appropriation was converted into the General Fund March 31, 1885, by order of the committee appointed to settle with the Auditor and Treasurer.		$ 18 00
Balance of Appropriations, March 31, 1885		$16,967 61
There has been collected and reported to this office by justices of the peace in the Yellowstone National Park, as fines collected, the sum of	$ 83 75	
Which is credited to the Yellowstone National Park Fund, making the total balance in said fund as follows:		$ 1,112 33
Yellowstone National Park Fund, balance	$1,028 58	
Fines collected	83 75	

STATEMENT NO. VI.

Trial balance of the books of the Territorial Auditor at the close of business December 31, 1885.

Page	NAME OF ACCOUNT.	Balance, Dr.	Balance, Cr.
2	Wyoming Territory (General Fund) . .		$20,794 59
11	Territorial Treasurer	$15,294 76	
14	Keep and transport prisoners . .		7,794 31
27	Stenographer's Salary		450 00
29	Stenographer's Mileage		310 20
33	Librarian's Salary		400 00
35	Library Rent and Contingent . .		985 37
39	Library Insurance and Purchase .		273 86
41	Auditor's Salary		250 00
43	Auditor's Contingent		54 07
45	Treasurer's Salary		100 00
47	Treasurer's Commissions . .		703 38
51	Treasurer's Contingent		17 25
53	Veterinarian's Salary		625 00
59	Auditing Committee		223 80
61	Teacher's Institute		261 92
63	Penitentiary Commission		701 70
67	Secretary's Contingent		17 99
69	Supreme Court—Clerk's Office		135 15
75	Geologist's Salary		437 50
79	Fish Commission Salary		150 00
81	Fish Commissioner's Contingent		80 23
85	Insurance Commissioner's Contingent .		345 11
111	Stock Indemnity Fund		10,424 69
131	Yellowstone National Park Fund . . .		1,112 33
90	Johnson County —Tax 1885	5,398 58	
92	Albany " "	5,090 20	
94	Carbon " "	6,243 46	
96	Sweetwater " "	2,761 38	
98	Uinta " "	2,625 76	
100	Laramie " " balance .	3,985 09	
102	Fremont " "	2,833 09	
104	Crook " "	3,578 32	
315	Contingent Expense, Eighth Legislative Assembly		38 80
318	Wyoming Reports		2 00
319	Telegrams relating to Yellowstone National Park		344 09
"	Printing Session Laws 1879		311 90
320	Care and transportation of Ordnance .		155 50
321	Superintendent of Weights and Measures Salary		100 00
"	Weights and Measures Contingent . . .		71 70
323	Code Commision, Stationery		50
"	Election Returns		500 00
324	Fish Hatching House		3 40
"	School Election, Stock and Irrigation Laws		18 10
325	Yellowstone National Park Laws		76 20
"	Weights and Measures—General Fund .	460 00	
		$48,270 64	$48,270 64

STATEMENT NO. VII.

Showing estimates for the expenditures for the two fiscal years next ending March 31, 188[illegible]:

Name of Account.	*Total Estimate.*
Prisoners and Juvenile Delinquents—Keep and transport	$12,500 00
Salaries—Auditor	3,600 00
Treasurer (and same fees as at present)	1,500 00
Veterinarian	5,000 00
Geologist and Mining Engineer	3,000 00
Fish Commission	700 00
Superintendent Fish Hatching House	1,800 00
Librarian	1,800 00
Stenographer	3,600 00
Superintendent of Weights and Measures	200 00
Contingent Expenses—Governor	2,400 00
Secretary	1,200 00
Auditor	1,000 00
Treasurer	800 00
Veterinarian	3,000 00
Geologist and Mining Engineer	1,200 00
Fish Commission	3,000 00
Penitentiary Commission	2,500 00
Insurance Commissioner	600 00
Library Rent and Contingent	3,000 00
Clerk's Office, Supreme Court	800 00
Supt. of Weights and Measures	200 00
Judges Supreme Court	1,200 00
Mileage—Stenographer	1,200 00
Territorial Library—Purchase of Books	2,000 00
Insurance	750 00
Commissions—Treasurer	2,000 00
Teachers—Institute Expenses	2,000 00
Yellowstone National Park—Salaries and fees in Criminal Cases	8,000 00
Ordinance—Care and Transportation of	400 00
Messenger for Election Returns	500 00
Total	$71,450 00

STATEMENT NO. VIII.

Consolidated Abstract of Assessment of the Territory of Wyoming, as returned by the clerks of the several counties for the year 1884.

COUNTY.	Acres of Land and Improvements.		Town Lots and Impr've ments.	Horses.		Mules and Asses.		Sheep and Goats.	
	No	Value	Value	No.	Value	No.	Value	No.	Value
Albany	10 634	243,624	752,555	7,825	206,135	242	11,975	115,800	175,625
Carbon ..	24,995	138,265	152,435	4,770	135,870	134	5 790	52,065	104,130
Fremont ..	614	6,946 75	11,660	4,089	135 872	147	3,415	33,000	66,000
Johnson...	2,589	147,785		6,532	208,610	312	19,751	8,900	17,800
Laramie ..	10,032 33	396 444 52	1,434,125	11,946	392,355	629	37,345	57,978	86,995
Sweetwater	6,400	54,320	68,590	1,295	59,755	81	4,435	17,034	38,364
Uinta	18,437	209 106	18,535	2,228	75,043	87	3,978	42,484	85,648
Total ..	73,701 33	1,196,391 27	2,437,900	38,685	1,213,640	1,632	86,689	327,261	574,562

Statement No. VIII.—Continued.

COUNTY	Cattle		Swine.		Carriages and Wagons.		Clocks, Watches and Jewelry.	Musical Instruments	Capital Empl'yd in Mdse and Manf'g
	No	Value.	No.	Value.	No.	Value	Value	Value	
Albany....	102,148	1,549,140	183	860	618	29,575	10,985	7,010	173,235
Carbon....	114,869	2,297,380	89	675	319	14,995	6,330	1,630	174,770
Fremont...	64,228	1,366 160	98	791	282	12,147	1,029 20	703 75	25,000
Johnson.	172,741	2,843,918 37	255	1,493	537	22,725	1,597	722	92 750
Laramie	283,194	4,261,115 00	416	2,185	948	53,170	12,600	11,840	427,300
Sweetwater	9,131	196,571	63	375	130	5,655	694	1,028	56,570
Uinta .	15,215	207,850	289	1,901	216	10,290	3,453	2 581	90,053
Total	761,832	12,822 464 37	1,393	8,279	3,050	147,557	36,688 20	25,514 75	1,039,688

Statement No. VIII.—Continued.

COUNTY	Moneys and Credits after Ded'cting Debts.	Stock in Corporations	Private Libraries.	Farm'g Utensils and Mech'nc Tools	House-hold Furniture.	Insur'nce Comp'ys Prem'ms	Property of Corporations	Other Property not enumerated.
		Value.	Value	Value.	Value.	Value	Value.	Value.
Albany ..	83,418	86,020	1,045	11,527	13,635			29,740
Carbon .	47,000	8,575	925	7,305	7,620			79,220
Fremont ..	4,580			5,788	2,280			58,112
Johnson...	37, 98	60	500	10,563	6,338			11,775
Laramie	239 350	153,150	3,100	24,095	32,250	35,958 13	67,835	93,150
Sweetwater	20,489 50		425	1,780	2,365			65,703
Uinta ..	44,272	5,015		4,496	8,556			41,109
Total....	476,707 50	252,820	5,995	65,554	73,044	35,958 13	67,835	372,809

STATEMENT NO IX.

Showing the number of miles, the assessed valuation per mile, and the total assessed valuation of railroads in the Territory of Wyoming, as determined by the Territorial Board of Equalization, August 4, 1884.

Name of County	NAME OF RAILROAD.	Miles in County	Valuation per Mile.	Aggregate Valuation
Albany . . .	Union Pacific--- Union Division	97	96 25	$ 933,625
Carbon . . .	Union Pacific--- Union Division	84	"	808,500
Laramie . .	Union Pacific--- Union Division	70 82	"	681,642 50
Laramie . .	Union Pacific---Kansas Division	10	"	96,250
Sweetwater .	Union Pacific--- Union Division	154 50	"	1,487,062 50
Uinta	Union Pacific--- Union Division	82 30	"	792,137 50
Totals . .	. . . .	498 62		4,799,217 50
Sweetwater .	Oregon Short Line . .	6 00	59 22	35,532 00
Uinta	Oregon Short Line . .	85 50	"	506,331 00
Total . .	. . . .	91 50		541,863 00

STATEMENT NO. X.

Showing the number of miles of telegraph in the several counties of the Territory of Wyoming, and the assessed valuation of the same as determined by the Territorial Board of Equalization, August 4, 1884.

Name of County.	Name of Telegraph Co.	No. of Miles.	Valuation per Mile.	Aggregate Assessed Valuation.
Albany . . .	Western Union	234	$75	$ 17,550 00
Carbon . . .	"	168	"	12,600 00
Laramie . .	"	299.5	"	22,462 50
Sweetwater .	"	315	"	23,625 00
Uinta	"	250.5	"	18,787 50
Total . . .	. . . .	1,267 00		$ 95,025 00

RECAPITULATION.

NAME OF CORPORATION.	No. of Miles.	Assessm't per Mile.	Aggregate Assessed Valuation.
Union Pacific Railway Company	489.47	9,633 50	$4,802,010 74
Oregon Short Line Railway Company . .	92.33	6,000	553,980
Western Union Telegraph Company . . .	1,267.00	75	95,025
Total value of corporations			$5,451,015 74

STATEMENT NO. XI.

Showing a schedule of the railway property in the Territory of Wyoming, as returned by the managements of the various companies to the Territorial Board of Equalization, for the year 1884.

UNION PACIFIC RAILWAY—UNION DIVISION.

Four hundred and eighty-seven and sixty-two one-hundredths (487.62-100) miles of road-bed, including right of way, track, bridges, culverts, etc., @ $6,500 per mile,	$3,169,530 00
One mile spur track to Fort Russell	4,500 00
Eighty-eight and thirty one-hundredths (88.30-100) miles of side tracks, spurs and switches @ $2,000 per mile . .	176,600 00
Four hundred and eighty-seven and sixty-two one-hundredths (487.62-100) miles, proportionate value of rolling stock. (It is impossible to separate rolling stock for Wyoming, as much of it runs over the entire road, but a fair proportionate value would be $1,800 per mile . .	877,716 00
(Telegraph line to be returned by and assessed to the Western Union Telegraph Company)	
At Cheyenne—Hotel	8,000 00
Round house	15,000 00
Express office and furniture	1,000 00
Stock yards	1,000 00
Ice house	1,000 00
Pump house, engine and water pipe	2,000 00
Oil room, office, telegraph office, etc	3,000 00
At Sherman—Round house	2,500 00
At Laramie—Machine shops, round house and coal sheds, including machinery, material, etc	100,000 00
Hotel	10,000 00
Superintendent's office	500 00

At Laramie—Roadmaster's office	500 00
Hospital	500 00
Superintendent car repairs	300 00
Express office and furniture	500 00
Ice house at the bridge	200 00
At Rock Creek—Eating house	2,500 00
At Medicine Bow—Engine house	2,500 00
At Rawlins—Hotel	5,000 00
Machine shops, machinery, etc	20,000 00
Round house, etc	15,000 00
Building department, house and sheds	1,000 00
Oil and ice house	500 00
Car repair shops	500 00
Boiler shop	500 00
Master mechanic's office and store room	1,000 00
At Rock Springs—Engine house	2,000 00
At Green River—Round house, machine shops, material, etc	25,000 00
At Evanston—Ice house	1,000 00
Eating house	2,500 00
Round house, shops, materials, machinery	50,000 00
Forty-three depot buildings, @ $1,000 each	43,000 00
Forty-two water stations, @ $1,200 each	50,400 00
One hundred and three section and dwelling house, @ $400 each	41,200 00
Eighteen coal stations	18,000 00
Furniture, fixtures, and all other personal property not herein enumerated	58,239 50
Total valuation	$4,714,185 50

UNION PACIFIC RAILWAY—DENVER PACIFIC BRANCH, KANSAS DIVISION.

Ten miles, right of way, depot, grounds, track and telegraph line, @ $6,350 per mile	$63,500 00
Seven hundred and sixty-six one-thousandths (766-1000) miles of side track at Cheyenne, @ $2,000 per mile	1,532 00
Pro rata of rolling stock owned and used by the Denver Pacific Railway Company, for ten miles in Laramie County, @ $1,400 per mile, as assessed in Colorado on same	14,000 00
Pro rata for ten miles of tools, machinery, fuel, etc. @ $300 per mile	3,000 00
Buildings at Cheyenne and Crow Creek	3,000 00
Total valuation	$85,032 00

OREGON SHORT LINE RAILWAY COMPANY.

Ninety-one and fifty one-hundredths (91 50-100) miles road-bed, including right of way, track, bridges, culverts, etc. @ $5,000 per mile	$ 457,500 00
Six miles side tracks, spurs and switches @ $2,000 per mile	12,000 00
Ninety-one and fifty one-hundredths (91 50-100) miles proportionate value of rolling stock @ $500 per mile . . . (The rolling stock in use is used along the whole line of road from Granger to Hailey).	45,750 00
Engine house at Granger	1,000 00
Five water stations, Nutria, Waterfall, Fossil, Sage and Cokeville, @ $1,500 each	7,500 00
Three coal sheds, Waterfall, Fossil and Cokeville, @ $1,000	3,000 00
Three depots, Twin Creek, Fossil and Cokeville, @ $1,200	3,600 00
Eight section houses, Nutria, Waterfall, Twin Creek, Fossil, Nugget, Sage, Beckwith and Cokeville, @ $500	4,000 00
Furniture, fixtures, tools and all other property not enumerated	7,500 00
Total valuation	$541,850 00

STATEMENT NO. XII.

Showing the total taxable valuation of property of the several counties of the Territory, the levy for Territorial General Fund upon the same as fixed and determined by the Territorial Board of Equalization, and the amounts charged to said counties, in 1884.

COUNTY.	Taxable Valuation as Assessed.	Levy in Mills.	Charged to County.
Albany	$ 4,328,279	¾	$ 3,246 21
Carbon	4,003,054	¾	3,002 29
Fremont . . .	1,700,484 70	¾	1,275 36
Johnson	3,271,506 37	¾	2,453 63
Johnson—Add'l assessment, levy on half	152,602	¾	57 23
Laramie . . .	8,497,112 65	¾	6,372 91
Sweetwater . .	2,123,329	¾	1,592 50
Uinta	2,232,152	¾	1,674 11
Total	$26,308,620 72	. . .	$19,674 24

STATEMENT NO. XIII.

Showing the total taxable valuation of all cattle, sheep, horses and mules of the several counties of the Territory, the levy for Territorial Stock Indemnity Fund on the same, as fixed and determined by the Territorial Board of Equalization, and the amounts charged to said counties in 1884.

COUNTY	Taxable Valuation as Assessed.	Levy in Mills.	Charged to County
Albany	$ 1,942,875	½	$ 971 44
Carbon	2,543,170	½	1,271 59
Fremont	1,571,447	½	785 72
Johnson	2,939,101 37	½	1,469 55
Johnson—Add'l assessment, levy on half	150,977	½	37 74
Laramie	4,778,140	½	2,389 07
Sweetwater	209,115	½	149 55
Uinta	472,510	½	236 26
Total	$14,697,314 37	. . .	$7,310 93

The above taxes were all due and paid into the Territorial Treasury on or before January 15, 1885, except the following rebates for double and erroneous assessments:

General Fund—Laramie County	$115 58	$130 19
Uinta County	14 61	
Stock Indemnity Fund—Laramie County	35 19	43 78
Uinta County	8 59	

STATEMENT NO. XIV.

Consolidated Abstract of Assessment of the Territory of Wyoming, as returned by the clerks of the several counties for the year A. D. 1885.

COUNTY.	Acres of Land and Improvements.		Town Lots and Impr've ments	Horses.		Mules and Asses.		Sheep and Goats.	
	No	Value	Value	No	Value.	No.	Value.	No.	Value
Albany	57,046	306,682	644,925	7,714	229,900	392	17,130	83,564	127,804
Carbon		181,685	231,440	6,311	175,400	196	4,455	66,136	117,202
Crook	11,685	29,250	10,465	4,982	166 809	155	10,375	4,591	6,743
Fremont		50 092		5,389	153,100	182	8,820	49,128	79,298
Johnson.	17,012 59	165,052 35	116 100	8,476	273,742	449	28,830	6,285	12,581
Laramie.	20,767 64	405,644 40	1,580,111	11,904	395,255	512	31,875	29,650	39,650
Sweetwater	7,030	96,915 50	89,515	2 943	88,701	161	4,545	22,311	52,223
Uinta......	18,639	70,810	170,323	2,326	73,917	154	5,333	52,325	104,599
Total. ..	132,180 23	1,307,131 25	2,842,879	50,045	1,556 824	2,081	111,363	322,935	540,550

Statement No. XIV.---Continued.

COUNTY	Cattle		Swine.		Carriages and Wagons.		Clocks, Watches and Jewelry.	Musical Instruments	Capital Empl'yd in Mdse and Manf'g.
	No	Value.	No.	Value.	No.	Value	Value	Value.	
Albany ...	91,985	1,409,940	177	880	339	29,660	11,009	7,140	180,555
Carbon ...	123 676	2,520,455	86	395	452	18,490	3 227	2,930	118,585
Crook. ..	115,942	2,126,544	210	489	319	10,147	1,331	535	13,800
Fremont.	76 324	1,526,480	139	1,180	329	12,135	926	915	63,725
Johnson	171,172	2,919,426 50	592	3,185	734	30,420	2,432	1,570	115,560
Laramie.	277,072	4,141,440	96	425	880	52,650	15,865	10,865	460,175
Sweetwater	19,947	419,931	14	176	137	6,065	1,765	2,237	76,155
Uinta ..	15 670	314,287	273	1,614	277	12 202	4,225	1,980	95,820
Total	894 788	15,388,503 50	1,637	8,342	3,527	171,769	40,780	28,172	1,124 375

Statement No. XIV.---Continued.

COUNTY.	Moneys and Credits after Ded'cting Debts.	Stock in Corporations	Private Libraries.	Farm'g Utensils and Mech'ne Tools	House-hold Furniture.	Insur'nce Comp'ys Prem'ms	Property of Corporations	Other Property not enumerated.
		Value	Value.	Value	Value	Value	Value.	Value.
Albany....	98,688	114,405	1 358	12,747	15,735			38,102
Carbon...	546,324	6,855	775	8,858	15,345			45,465
Crook ...	5,405			5,890	665			84,560
Fremont.	9,075	550	75	5,970	800			66,100
Johnson ..	25,740	13 396 50	555	15,333	11,185			15,204
Laramie...	216,155	275,000	4 625	22,715	48,275	48,588 32	80,810	20,395
Sweetwater	19,714 50	200	1,010	1,360	3,215			87,227
Uinta ..	107,100	1,282		29,491	6,762		12,733	13 627
Total	1,028 201 50	411,788 50	8,398	102,364	101,982	48,588 32	93,543	320,680

STATEMENT NO. XV.

Showing the number of miles, the assessed valuation per mile, and the total assessed valuation of railroads in the Territory of Wyoming, as determined by the Territorial Board of Equalization, August 3, 1885.

Name of County.	NAME OF RAILROAD.	Miles in County	Valuation per Mile.	Aggregate Valuation.
Albany . . .	Union Pacific --- Union Division	96.85	9,633 50	$ 933,004 47
Carbon . . .	Union Pacific --- Union Division	84.	do	809,214
Laramie. . .	Union Pacific --- Union Division	70.82	do	682,244 47
Laramie. . .	Union Pacific---Kansas Division	10.	do	96,335
Sweetwater .	Union Pacific --- Union Division	54.50	do	1,488,375 75
Uinta	Union Pacific --- Union Division	82.30	do	792,837 05
Total . . .	. . . .	498.47		4,802,010 74
Sweetwater .	Oregon Short Line . .	2.62	6,000	15,720 00
Uinta	Oregon Short Line . .	89 71	"	538,260 00
Total	. . . .	92.33		$553,980 00

NOTE.—The Colorado Central Railway under the present law is made returnable to Laramie County, and is not included in the above statement.

STATEMENT NO. XVI.

Showing the number of miles of telegraph in the several counties of the Territory of Wyoming, and the assessed valuation of the same as determined by the Territorial Board of Equalization, August 3, 1885.

Name of County.	NAME OF TELEGRAPH CO.	No. of Miles.	Valuation per Mile.	Aggr As Valu
Albany . . .	Western Union	234	$75	$ 1 [illegible]
Carbon . . .	"	168	"	1 [illegible]
Laramie . .	"	299 50	"	[illegible] 50
Sweetwater .	"	315	"	[illegible]
Uinta . .	"	250 50	"	[illegible] 50
Total . . .	. . . .	1,267		[illegible] 00

NOTE.—The Cheyenne and Black Hills Telegraph under the present law i [illegible] ble to Laramie County, and is not included in the above statement.

RECAPITULATION.

NAME OF CORPORATION.	No. of Miles.	Assessm't per Mile.	Aggregate Assessed Valuation.
Union Pacific Railway Company	498 62	$9,625	$4,799,217 50
Oregon Short Line Railway Company . .	91 50	5,922	541,863 00
Western Union Telegraph Company . . .	1,267	75	95,025 00

Total Value of Corporations $5,436 105 50

STATEMENT NO. XVII.

Showing a schedule of the railway property in the Territory of Wyoming, as returned by the managements of the various companies to the Territorial Board of Equalization, for the year 1885.

UNION PACIFIC RAILWAY—UNION DIVISION.

Description.	*Valuation.*
Four hundred and eighty-nine and forty-seven one-hundredths (489.47-100) miles of road-bed, including right of way, track, bridges, culverts, etc., @ $6,500 per mile,	$3,168,555 00
Eighty-eight and three-tenths (88.3-10) miles of side tracks, spurs and switches @ $2,000 per mile	176,600 00
Four hundred and eighty-nine and forty-seven one-hundredths (489.47-100) miles, proportionate value of rolling stock, @ $1,800 per mile	877,446 00
(Rolling stock being used on entire line, the foregoing is deemed a just and fair valuation.)	
One mile spur track to Fort Russell	4,500 00
(Telegraph line to be returned by and assessed to the Western Union Telegraph Company)	
At Cheyenne—Hotel	8,000 00
Round house	15,000 00
Express office and furniture	1,000 00
Stock yards	1,000 00
Ice house	1,000 00
Fifteen store, oil and office building, @ $300	4,500 00
Three repair and carpenter shops	800 00
Pump house and engine	2,000 00
At Granite Canon—Repair shop	250 00
At Sherman—Round house	2,000 00

At Laramie—Hotel	10,000 00
Round house, shops, coal sheds, schutes, machinery, material, etc	80,000 00
Superintendent's office	500 00
Roadmaster's office	500 00
Express office and furniture	500 00
Superintendent car repairs' office	300 00
Division master mechanic's office, two store houses, battery house, yard master's office—five, @ $400 each	2,000 00
Ice house at the bridge	500 00
At Rock Creek—Eating house	2,500 00
At Medicine Bow—Engine house	2,500 00
At Rawlins—Hotel	5,000 00
Round house, shops, material, machinery, etc	35,000 00
Building department, house and sheds	1,000 00
Master mechanic's office and storeroom	1,000 00
Oil house	500 00
Ice house	300 00
Yard master's office	200 00
Car repair shops	500 00
Boiler shop	500 00
At Rock Springs—Engine house	2,000 00
At Green River—Round house, material, machinery, etc	25,000 00
Ice house, oil house and office	1,200 00
At Granger—Boarding house	800 00
Round house	2,500 00
Oil house	200 00
At Evanston—Eating house	2,500 00
Ice house	1,000 00
Bridge department building	300 00
Round house, shops, machinery, materials	50,000 00
Eleven store, lime, oil and office buildings	2,750 00
One hundred section houses, @ $400 each	40,000 00
Thirty-nine tenement houses, @ $300 each	11,700 00
Forty-three depot buildings, @ $1,000 each	43,000 00
Four freight buildings	2,400 00
Thirty-six old style tanks Seven new style tanks } Total 43 @ $1,200 each	51,600 00
Thirteen fuel stations, @ $1,000 each	13,000 00
Furniture, fixtures, and all other personal property not herein enumerated	40,000 00
Total valuation	$4,695,901 00

UNION PACIFIC RAILWAY—DENVER PACIFIC BRANCH, KANSAS DIVISION.

Ten miles, right of way, etc., (Laramie County), @ $6,000 per mile	$ 60,000 00
Seven hundred and sixty-six one-thousandths (766-1000) miles of side track at Cheyenne, @ $2,000 per mile	1,532 00
Pro rata of rolling stock for ten miles, $1,005.66 per mile, as assessed in Colorado	10,056 60
Pro rata for ten miles of tools, machinery, fuel, etc. @ $74.30 per mile, as assessed in Colorado	743 00
Buildings at Cheyenne and Crow Creek	3,000 00
Total valuation	$75,331 60

OREGON SHORT LINE RAILWAY COMPANY.

Ninety-two and thirty-three one-hundredths (92 33-100) miles road-bed, including right of way, track, bridges, culverts, etc., @ $5,000 per mile	$ 461,650 00
Six and five-tenths (6.5-10) miles side tracks, spurs and switches @ $2,000 per mile	13,000 00
Ninety-two and thirty-three one-hundredths (92 33-100) miles proportionate value of rolling stock @ $565 per mile	52,166 00
At Granger—Engine house	1,000 00
Oil house	500 00
Store house	500 00
Tenement house	500 00
Three depots, Twin Creek, Fossil and Cokeville, @ $1,200	3,600 00
Three coal sheds, Waterfall, Fossil and Cokeville, @ $1,000	3,000 00
Five water stations, Nutria, Waterfall, Fossil, Sage and Cokeville, @ $1,500 each	7,500 00
Nine station houses, Granger, Nutria, Waterfall, Twin Creek, Fossil, Nugget, Sage, Beckwith and Cokeville, @ $500	4,500 00
Furniture, fixtures, tools and all other property not enumerated	6,000 00
Total valuation	$553,916 00

STATEMENT NO. XVIII.

Showing the total taxable valuation of property of the several counties of the Territory, the levy for Territorial General Fund upon the same as fixed and determined by the Territorial Board of Equalization, and the amounts charged to said counties, in 1885.

COUNTY.	Taxable Valuation as Assessed.	Levy in Mills.	Charged to County.
Albany	$4,197,814 47	1	$4,197 81
Carbon	4,829,700	1	4,829 70
Crook	2,423,058	1	2,423 06
Fremont	1,949,241	1	1,949 24
Johnson	3,781,290 35	1	3,781 29
Laramie	8,680,980 69	1	8,680 98
Sweetwater	2,478,675 75	1	2,478 68
Uinta	2,376,489 55	1	2,376 49
Total wealth of Wyoming	$30,717,249 81		$30,717 25

STATEMENT NO. XIX.

Showing the total taxable valuation of all cattle, sheep, horses and mules of the several counties of the Territory, the levy for Territorial Stock Indemnity Fund on the same, as fixed and determined by the Territorial Board of Equalization, and the amounts charged to said counties in 1885.

COUNTY	Taxable Valuation as Assessed.	Levy in Mills.	Charged to County.
Albany	$1,784,774	½	$ 892 39
Carbon	2,827,512	½	1,413 76
Crook	2,310,521	½	1,155 26
Fremont	1,767,698	½	883 85
Johnson	3,234,579 50	½	1,617 29
Laramie	4,608,220	½	2,304 11
Sweetwater	565,400	½	282 70
Uinta	498,536	½	249 27
Total	$17,597,240 50		$8,798 63

The above taxes will be due and payable into the Territorial Treasury on or before January 15, 1886.

STATEMENT NO. XX.

Showing the total annual assessed valuation of the property of the Territory of Wyoming, as determined by the Territorial Board of Equalization since 1877.

Year.		Valuation	Tax Levy for Ge'nl fund
1878	Total assessed valuation	$10,066,620	3 mills.
1879	Total assessed valuation	10,603,203 95	4 mills.
1880	Total assessed valuation	11,835,564	4 mills.
1881	Total assessed valuation	13,866,118 06	4 mills.
1882	Total assessed valuation	17,600,481 78	2 mills.
1883	Total assessed valuation	22,533,920 85	1 mill.
1884	Total assessed valuation	26,308,620 72	¾ mill.
1885	Total assessed valuation	30,717,249 81	1 mill.

REMARKS.

Section 2 of Title II, Chapter 113, of the Compiled Laws of Wyoming, directs the Auditor to prepare and report to the Legislative Assembly, at the commencement of each session:

First.—A detailed and full statement of the condition of the revenue and the amount of the expenditures for the two preceding years.

Second.—A full and detailed statement of the public debt.

Third.—Estimates of the revenue and expenditures for the two succeeding years.

Fourth.—Such plans as he may deem expedient for the support of the public credit, for lessening the public expenses, for promoting economy in public offices, and generally for the better management and more perfect understanding of the fiscal affairs of the Territory.

Fifth.—A tabular statement showing the amount of revenue charged to each county for the two preceding years, the aggregate amount of each object of taxation, together with the tax due on the same.

Section 2, of Chapter 47, of Session Laws of Wyoming Territory, passed by the Seventh Legislative Assembly directs that said report shall be made to you on or before January 10.

In compliance with above instructions, your excellency will find in statements preceding everything relating to the business of this department which has been transacted from date of last report, December 31, 1883, up to and including

December 31, 1885. You will find in their regular order, statements of the subjects set forth in the law. Some are not detailed by items, as in my opinion such is not contemplated by the law. In appropriation statement I have given the amount expended in bulk, and also the disbursements of the Stock Indemnity Fund in bulk—items can be found and vouchers exhibited, which are now on file in this office. All those who were on file prior to April 1, 1885, were examined, compared with the books of this office and approved by a committee appointed for that purpose; those audited since that date will soon be examined and compared by a like committee.

Statement No. I shows the balance in each fund in the Treasury December 31, 1883, the total amount in the Treasury, the receipts for each fund for the two years next thereafter ensuing, the total receipts, the disbursements of each fund, the total disbursements, the balances in each fund in the Treasury, and the total balance in the Treasury December 31, 1885. Statement No. II is the same in detail. At the close of Statement No. II is a statement of warrants drawn by this department prior to December 31, 1885, not yet presented to the Treasurer, and a statement of receipts by the Treasurer prior to December 31, 1885, for which his duplicate vouchers had not been forwarded to this office by the persons to whom they were issued, prior to December 31, 1885.

PUBLIC DEBT.

The financial affairs of the Territory have been carefully and economically administered of late years, and, notwithstanding the reductions which have been annually made in the rate of taxation, the Territory at this time has no public indebtedness.

INCREASE IN AMOUNT OF TAXABLE PROPERTY.

By reference to Statement No. XX, it will be seen that the total assessed valuation of taxable property in 1878 was $10,066.620.00. In 1885 the total assessed valuation was $30,717,249.81, showing an increase in a period of eight years of $20,650,629.81, or over 200 per centum, being an average yearly increase of 25 per centum.

There is reason to believe that, with the building of proposed lines of railroad, and the consequent development of interior Wyoming, this splendid showing will be greatly surpassed in the future.

COMPENSATION OF TERRITORIAL OFFICERS.

While in the early years of the Territory, when the labor of the Territorial officers was not great and the amount of taxable property was small, the compensation of those officers may have been sufficient and reasonable. I submit that the increased work and labor required by reason of the growth of the Territorial resources and property is such that the salaries heretofore paid are not sufficient, and are not in keeping with the compensation paid for like services in other employments throughout the Territory. I have, therefore, recommended such increase of salary, (as will be seen by reference to estimates for expenditures for the two ensuing fiscal years), as in my judgment will be a fair compensation for the services required.

CONTINGENT EXPENSES OF TERRITORIAL OFFICERS.

Much that has been said concerning salaries for Territorial officers applies to the appropriations for contingent expenses. The increased business of the various offices requires more room, more stationery, and, in some cases, clerical help, all of which must be paid from the appropriation for contingent expenses, or by the official out of his private funds.

In this connection I wish to recommend that all appropriations for contingent expenses of Territorial officers be made payable in monthly or quarterly installments, in order that a just division of the appropriation may be made hereafter. It has been the custom to make the appropriations for contingent expenses in such a manner that the entire amount can be drawn at the commencement of the fiscal year, and in many instances has been drawn to pay contingent expenses that have accumulated during the previous year.

This system works peculiar hardship in cases where a change is made in the officer soon after the beginning of the fiscal year, as the newly appointed officer is likely to find the contingent appropriation almost, if not entirely, exhausted. No blame, however, can be attached to the retiring officer, as he in turn came into office with no available contingent. The trouble is in consequence of the appropriations being too small. This is particularly true of the Governor's office, where the contingent expenses have been in arrears for a number of years. During the early years of the Territory, when the population was small, the taxable property much less and the duties of the executive far less than to-day, the amount appropriated for contingent expenses ranged from five hundred dollars to one thousand dollars. At that time the Governor's salary was thirty-five hundred dollars, as against twenty-six hundred dollars at the present time; the amount appropriated by the United States for contingent expenses at that time was one thousand dollars, as against five hundred dollars at present.

The statement regarding the executive office is equally applicable to the appropriations for the contingent expenses of other Territorial offices.

Of course, these suggestions to make appropriations for contingent expenses payable monthly or quarterly would work a great inconvenience, unless the deficiencies were fully paid for the fiscal year ending March 31, 1886. If the Territory will adopt the principle of paying to date all arrearages, and then provide against drawing appropriations except monthly or quarterly, each officer, in case of change, would receive equal benefit from the amount appropriated.

I therefore recommend the early appropriation of such an amount as will be necessary to pay the arrears of the contingent expenses of the Governor's office, and to provide for the contingent expenses of said office until the close of the present fiscal year.

TERRITORIAL LIBRARY.

The appropriation for insurance and purchase for the Territorial Library from March 31, 1884, to March 31, 1886, was too small. Some of this appropriation was used to pay indebtedness that had accrued prior to March 31, 1884, and there is now more indebtedness than the unexpended balance of this appropriation will pay. There should be an appropriation to pay such indebtedness, and the appropriation for the two next fiscal years should be at least two thousand dollars for the purchase of books alone. In 1882 the appropriation for the purchase of books was twelve hundred dollars, which proved too small. In 1884 the appropriation for the purchase of books, for insurance premiums on $12,000 and for amounts due for past expenses, was one thousand dollars. There has been paid for insurance premiums on $12,000 for the two fiscal years, the sum of six hundred and sixty dollars, leaving the sum of three hundred and forty dollars to pay outstanding indebtedness and for the purchase of books for the two fiscal years.

FISH COMMISSION.

I have recommended an increase of appropriation for the Fish Commission, as in my opinion the appropriation for the commission by the Eighth Legislative assembly was not adequate for its demands.

PENITENTIARY COMMISSION.

There will be several thousand dollars of an unexpended balance of the appropriation by the Eighth Legislative Assembly to pay for the keeping and transporting of Territorial prisoners and juvenile delinquents. I have, therefore, recommended the appropriation of the amount for that purpose for the two next fiscal years, suggested by the Commission as being ample.

CLAIMS.

There have been some claims presented to this office that the Auditor could not audit and draw a warrant therefor, but none of the claimants have requested them to be certified to the Legislative Assembly; however, they should receive the attention of the Assembly, and a list of them will be furnished when requested.

REPORTS.

There has been a demand, far exceeding the supply, for the reports of the various offices, and especially for the report of the Auditor, by boards of trade, railway companies, bankers, commission merchants, investors and others. There should be as many as five hundred copies printed for distribution.

Very respectfully submitted,

PERRY L. SMITH,
Territorial Auditor of Public Accounts.

REPORT OF TERRITORIAL TREASURER

For the Years 1884 and 1885.

Territorial Treasurer's Office,
Cheyenne, Wyoming,
January 1, 1885.

To His Excellency, Governor William Hale:

Sir:—In compliance with section two (2), chapter forty-seven (47), Session Laws of 1882, I have the honor to submit the following report of the transactions of this department since my last report, December 31, 1883, up to and including December 31, 1884.

Very Respectfully,
Your Obedient Servant,
F. E. Warren,
Territorial Treasurer.

CASH.

Balance December 31, 1883	$49,782 68	
Received from all sources in 1884	23,006 73	
Disbursements for all purposes in 1884		$37,992 06
Balance December 31, 1884		34,797 35
	$72,789 41	$72,789 41

CASH—Stock Fund.

Balance December 31, 1883	$ 6,400 55	
Received in 1884	3,977 14	
Disbursed, charged March 31, 1884		$ 777 78
Disbursed since March 31, 1884, in 1884		1,905 31
Balance December 31, 1884		7,694 60
	$10,377 69	$10,377 69

CASH—GENERAL FUND.

Balance December 31, 1883	$43,382 13	
Received in 1884	19,029 59	
Paid on appropriations, charged out March 31		$ 4,013 37
Paid on appropriations only partly exhausted		31,295 60
Balance December 31, 1884		27,102 75
	$62,411 72	$62,411 72

CASH STATEMENT.

Balance in Treasury December 31, 1883:		
General Fund	$43,382 13	
Stock Indemnity Fund	6,400 55	$49,782 68
Received since—From Stock Indemnity Fund, January 10, 1884, error warrants 292, 293 and 295		15 00
Insurance Fund March 29, 1884		741 00
Yellowstone Park Fund November 18, 1884, J. W. Weimer, J. P. fees,	2 50	
November 18, 1884, M. E. Metcalf, J. P. fees	15 00	17 50
Albany County, January 12, 1884, acc't taxes 1883, General Fund	102 18	
November 25, 1884, account of taxes 1884, General Fund	2,500 00	
November 25, 1884, account of taxes 1884, Stock Fund	500 00	
December 24, 1884, account of taxes 1884, General Fund	746 21	
December 24, 1884, account of taxes 1884, Stock Fund	471 44	4,319 83
Carbon County, January 5, 1884, acc't taxes 1883, General Fund	3,662 37	
December 31, 1884, account of taxes 1884, General Fund	3,002 29	
December 31, 1884, account of taxes 1884, Stock Fund	1,271 59	7,936 25
Johnson County, January 7, 1884, acc't taxes 1883, General Fund	743 77	
January 10, 1884, account of taxes 1883, General Fund	147 09	
December 1, 1884, account of taxes 1884, General Fund	2,453 63	

December 1, 1884, account of taxes 1884, Stock Fund	1,153 35	
December 29, 1884, account of taxes 1884, Stock Fund	316 20	4,814 04
Laramie County, January 15, 1884, acc't taxes 1883, General Fund	691 94	
January 15, 1884, account of taxes 1879, General Fund	88	
January 15, 1884, account of taxes 1880, General Fund	265 32	
January 15, 1884, account of taxes 1881, General Fund	8 94	967 08
Sweetwater County, January 3, 1884, account of taxes, 1883, General Fund	705 64	
November 25, 1884, account of taxes 1884, General Fund	1,592 50	
November 25, 1884, account of taxes 1884, Stock Fund	149 56	2,447 70
Uinta County, January 14, 1884, acc't taxes 1883, General Fund	485 21	
November 7, 1884, account of taxes 1884, General Fund	1,163 12	
November 10, 1884, account of taxes 1884, Stock Fund	100 00	1,748 33

DISBURSEMENTS FOR 1884.—APPROPRIATIONS OF 1882.

Publishing Volume II of Supreme Court records	$ 350 00
Washington monument	188 66
Penitentiary Commissioner's contingent expense	271 60
Treasurer's salary and commission	381 09
Auditor's salary	333 34
Stenographer's salary	375 00
Stenographer's mileage	126 60
Veterinarian's salary	833 33
Auditor's contingent expense	94 15
Veterinarian's contingent expense	129 73
Territorial Librarian's salary	400 00
Territorial Librarian's contingent expense	516 67
Expense Fish Commissioner	97 50
Clerk of Supreme court	24 25
Supreme Court judges' salary	473 60
Territorial Geologist's salary	750 00
Keep and transport of prisoners	3,601 53

UNDER APPROPRIATIONS OF 1884.

Stock Indemnity Fund	2,683 09
Relief of Sterling Birmingham	122 67
Printing Governor's message and Territorial officers' reports	332 00
Pay of officers of Eighth Legislature	2,420 00
Telegrams about Yellowstone Park	142 11
Relief of Laramie County	1,000 00
Contingent expense of Eighth Legislature, printing and papers	552 99
Special committee to settle with Auditor and Treasurer	221 40
Contingent expense of clerks of Eighth Legislature	100 00
Relief of E. S. N. Morgan	38 70
Keep and transport of prisoners	2,949 15
Penitentiary Commission	761 65
Treasurer's salary	300 00
Treasurer's commission	308 75
Auditor's salary	750 00
Veterinarian's salary	1,874 99
Governor's contingent expense	999 83
Secretary's contingent expense	471 45
Auditor's contingent expense	106 45
Treasurer's contingent expense	200 00
Veterinarian's contingent expense	1,526 08
Care and transportation of ordnance	87 50
Geologist's salary	1,000 00
Geologist's contingent expense	420 50
Stenographer's salary	1,350 00
Stenographer's mileage	281 80
Auditing committee	197 40
Librarian's salary	400 00
Library rent and contingent expense	801 60
Library insurance and purchase	396 14
Teacher's institute expense	738 85
Clerk's office, Supreme court	204 70
Relief of J. M. Lobban	147 09
Distributing Wyoming reports	98 00
Relief of Hon. Mike Murphy	100 00
Fish Commissioner's contingent expense	397 29
Fish Commissioner's salary	150 00
Fish hatchery house	462 15
Insurance Commissioner's contingent expense	144 89
Printing Session Laws of 1879	388 10

Printing school, election, stock and irrigation laws			26 90
Printing Yellowstone Park laws			178 80
Yellowstone Park fund			3,211 99
Cash balance on hand December 31, 1884:			
General Fund	$27,102 75		
Stock Indemnity Fund	7,694 60		34,797 35
		$72,789 41	$72,789 41

TERRITORIAL TREASURER'S TRIAL BALALCE, DECEMBER 31, 1884.

Wyoming Territory			$77,725 91
Publishing Volume II, Supreme court records, appropriation of 1882		$ 350 00	
Veterinarian's salary, appropriation of 1882		4,791 62	
Veterinarian's contingent fund, appropriation of '82		1,749 14	
Territorial Librarian's and Superintendent of Public Instruction's salary, appropriation of 1882		1,600 00	
Care and transportation of ordnance, appropriation of 1882		166 66	
Expense Fish Commission, appropriation of 1882		1,499 34	
Clerk of Supreme court, appropriation of 1882		92 30	
Supreme court judges' salary, appropriation of 1882		2,373 60	
Territorial Librarian and Superintendent of Public Instruction's contingent expenses, appropriation of 1882		2,513 61	
Cash—General Fund		27,102 75	
Cash—Stock Fund		7,694 60	
Stock Indemnity Fund (disbursed)		1,905 31	
Albany County—			
Account of General Fund, tax of 1884,	$3,246 21		
Account of Stock Fund, tax of 1884	971 44		4,217 65
Carbon County—			
Account of General Fund, tax of 1884,	3,002 29		
Account of Stock Fund, tax of 1884	1,271 59		4,273 88
Johnson County—			
Account of General Fund, tax of 1884,	2,453 63		
Account of Stock Fund, tax of 1884	1,469 55		3,923 18
Sweetwater County—			
Account of General Fund, tax of 1884,	1,592 50		
Account of Stock Fund, tax of 1884	149 56		1,742 06
Uinta County—			
Account of General Fund, tax of 1884,	1,163 12		
Account of Stock Fund, tax of 1884	100 00		1,263 12

Keep and transport of prisoners, appropriation of 1882	18,975 82	
Telegraph about Yellowstone Park, appropriation of 1884	142 11	
Contingent expense of Eighth Legislature, printing and papers, appropriation of 1884	552 99	
Special committee to settle with Auditor and Treasurer, appropriation of 1884	221 40	
Keep and transport of prisoners, appropriat'n of '84	2,949 15	
Penitentiary commission, appropriation of 1884	761 65	
Treasurer's salary	300 00	
Treasurer's commission	308 75	
Auditor's salary	750 00	
Veterinarian's salary	1,874 99	
Governor's contingent expense	999 83	
Secretary's contingent expense	471 45	
Auditor's contingent expense	106 45	
Treasurer's contingent expense	200 00	
Veterinarian's contingent expense	1,526 08	
Care and transport of ordnance	87 50	
Geologist's, etc., salary	1,000 00	
Geologist's contingent expense	420 50	
Stenographer's salary	1,350 00	
Stenographer's mileage	281 80	
Auditing committee	197 40	
Librarian's salary	400 00	
Librarian's rent and contingent expense	801 60	
Library insurance and purchase	396 14	
Teacher's institute expense	738 85	
Clerk's office, Supreme court	204 70	
Relief J. M. Lobban	147 09	
Distributing Wyoming reports	98 00	
Relief of Hon. Mike Murphy	100 00	
Fish Commission contingent expense	397 29	
Fish Commissioner's salary	150 00	
Fish hatchery house	462 15	
Insurance Commissioner's contingent expense	144 89	
Printing Session Laws of 1879	388 10	
Printing school, election, stock and irrigation laws	26 90	
Printing Yellowstone Park laws	178 80	
Yellowstone Park fund	3,194 49	
	$93,145 80	$93,145 80

WARRANTS PAID IN 1884.

Date.	No.	PAYEE	Amount.
1883.			
Sept. 20	336	Otto Gramm	$ 5 00
Nov. 7	372	Joseph Nickerson	16 43
Dec. 29	401	S. K. Sharpless	322 30
29	402	Louis Miller	133 10
29	403	Louis Miller	130 [illegible]
1884.			
Jan. 5	408	J. H. Fintock	89 50
5	409	[illegible]	110 20
5	410	G. E. Bailey	375 00
7	411	Samuel C. Park	100 00
7	412	Gustav Schnitger	276 00
7	413	W. H. B. Stout	816 40
7	414	Corlett & Rosendale	50 00
7	415	Jacob B. Bair	100 00
8	416	E. A. Abry, assistant cashier . .	3 00
8	417	L. D. Kennedy	66 67
9	418	Corlett & Rosendale	10 60
12	419	John Slaughter	200 00
12	420	W. C. Irvine, treasurer	193 75
15	421	E. A. Abry, assistant cashier . .	524 44
16	422	E. A. Abry, assistant cashier . .	53 33
16	423	Joseph Nickerson	2 68
21	424	W. M. Masi	24 25
23	425	J. D. Hopkins	208 33
26	426	F. B. Warren	266 27
28	427	J. A. Kiner	350 00
31	428	E. A. Abry, assistant cashier . .	1 15
Feb. 2	429	R. C. Morris	125 00
4	430	Bristol & Knabe	4 50
11	431	Sterling Birmingham	122 67
11	432	E. A. Abry, assistant cashier . .	5 29
20	433	E. S. N. Morgan	188 65
25	434	S. K. Sharpless	105 30
29	435	Andrew Jackson	133 34
	436	*Cancelled*	
Mar. 4	437	John Slaughter	75 24
5	438	Daily Democrat Pub. Co . .	332 00
5	439	Robert C. Morris	125 00
7	440	Robert C. Morris	87 50
8	441	John D. Shiner	420 00
8	442	E. S. Whittier	225 00
8	443	Charles Russell	180 00
8	444	James B. Sener	73 60
8	445	William W. Jeffrey	75 00
8	446	Western Union Telegraph Co .	142 11
8	447	John Nealon	120 00
8	448	Nellis Corthell	490 00
8	449	William Moore	180 00
8	450	H. S. Fowler	300 00

Date.	No.	PAYEE.	Amount.	When Pd.
Mar. 8	451	J. M. Finley	$ 360 00	Mar. 8
8	452	John M. Cahill	120 00	8
10	453	Isaac Bergman, treasurer	1,000 00	10
10	454	The Democratic Leader	175 65	10
10	455	E. A. Slack	134 34	10
11	456	H. E. Teschemacher	24 00	12
12	457	F. E. Warren Mercantile Co . .	72 70	12
12	458	F. E. Warren	27 30	12
19	459	E. S. N. Morgan	38 70	19
19	460	Boomerang Publishing Co . . .	99 00	19
22	461	R. C. Morris	38 80	22
24	462	Bristol & Knabe	10 75	24
24	463	Hayford & Gates	28 80	26
24	464	J. K. Moore	70 21	31
25	465	H. V. S. Groesbeck	41 10	25
27	466	J. H. Finfrock	15 60	31
27	467	Uinta County	160 20	April 7
27	468	Illinois State Penitentiary . . .	162 54	3
28	469	Sweetwater Gazette	28 80	10
28	470	John Slaughter	43 22	28
29	471	N. W. L. S. Journal	28 80	29
31	472	Jesse Knight, auditor	333 34	Mar. 31
31	473	E. A. Slack	125 00	31
31	474	E. W. Bennett	50 00	31
31	475	F. E. Warren	375 00	31
31	476	F. E. Warren	100 00	31
31	477	F. E. Warren	14 82	31
April 2	1	G. L. Vickery	423 18	April 14
3	2	A. V. Quinn	456 30	3
3	3	A. V. Quinn	148 30	3
4	4	H. V. S. Groesbeck	33 10	3
4	5	John Slaughter	200 00	4
4	6	James D. Hopkins	625 00	4
4	7	Bristol & Knabe	25 00	5
4	8	James D. Hopkins	129 73	4
8	9	J. K. Moore	29 79	14
9	10	Gustav Schnitger, U. S. M . . .	210 00	9
11	11	E. A. Slack	21 90	11
11	12	E. A. Slack	15 50	11
11	13	E. A. Slack	18 75	11
14	14	W. H. B. Stout	802 80	19
	15	*Not Presented*		
15	16	Frank M. Foote	98 40	21
15	17	C. W. Riner	10 00	19
15	18	F. E. Warren	55 00	15
17	19	H. E. Teschemacher	16 00	19
18	20	C. W. Riner	11 20	May 5
18	21	James M. Tisdell	80 80	April 21
18	22	Potter & Riner	10 00	19

Date.	No.	PAYEE.	Amount.	When Pd
April 19	23	Samuel C. Parks	$ 100 00	April 19
19	24	Mike Murphy	100 00	25
19	25	Jacob B. Blair	100 00	19
19	26	J. D. Freeborn	12 25	21
19	27	Carbon County Journal	28 80	23
19	28	Rawlins Print. and Pub. Co.	4 50	23
19	29	H. Hoffman	1 00	26
21	30	John W. Jones	10 00	22
25	31	T. A. Kent	82 50	25
26	32	S. B. Tuttle	55 00	May 7
28	33	H. S. Oliver	96 25	April 29
29	34	Riner & Johnson	96 25	29
30	35	John Slaughter	98 00	30
30	36	Democratic Leader	9 10	May 3
May 1	37	James M. Lobban	147 09	13
1	38	Robert C. Morris	11 00	1
1	39	" "	150 00	1
2	40	James D. Hopkins	27 70	2
2	41	" "	208 33	2
7	42	John Slaughter	75 00	8
7	43	The Boomerang Pub. Co.	10 56	9
10	44	E. A. Slack	10 50	10
10	45	James B. Walsh	2 50	12
26	46	Moore & Stevens	3 00	26
27	47	E. S. N. Morgan	8 95	27
29	48	John Slaughter	57 89	29
31	49	Robert C. Morris	150 00	31
31	50	James D. Hopkins	208 33	31
31	51	" "	95 00	31
June 2	52	D. W. Gill	75 00	June 2
3	52½	G. C. Charlton	144 44	4
3	53	J. W. Bruner	7 95	3
7	54	Charles Kehler	40 00	7
9	55	W. M. Masi	1 95	12
9	56	Charles Kehler	50 66	9
9	57	Bristol & Knabe	20 00	9
16	58	Governor William Hale	80 00	16
16	59	" " "	100 00	16
21	60	The Uinta Chieftain	28 80	26
30	61	John Pratley	265 65	July 23
30	62	James D. Hopkins	208 33	June 30
30	63	" "	60 35	30
July 1	64	William C. Irvine	193 71	July 1
1	65	" "	250 00	1
1	66	D. W. Gill	75 00	1
3	67	G. E. Bailey	375 00	3
3	68	E. A. Slack	150 00	3
5	69	Z. Swannger	30 00	5
5	70	John Slaughter	200 00	5

Date.	No.	PAYEE.	Amount	When Pd.
July 5	71	Perry L Smith, Auditor	$ 250 00	July 5
5	72	Donzelman & Stewart	25 00	5
7	73	G E Bailey	100 00	7
8	74	E A Slack	39 00	9
8	75	F E Warren, Treasurer	100 00	8
9	76	Robert C Morris	66 80	9
14	77	F E Warren	89 00	16
16	78	Alex Swan	80 00	16
18	79	Paul & Brewston	93 33	18
22	80	W H B Stout	730 00	28
22	81	Gustav Schnitger	150 00	Aug. 7
23	82	L Murrin	143 20	July 25
23	83	James M Tisdel	76 30	23
23	84	Frank M Foote	98 50	23
23	85	F M Canton, Sheriff	689 75	31
31	86	Robert C Morris	150 00	31
31	87	James D Hopkins	178 20	31
31	88	James D Hopkins	208 34	31
Aug. 1	89	D W Gill	75 00	Aug. 1
1	90	Susan R Johnson, P M	29 60	12
1	91	William Hale	142 50	5
5	92	W M Masi	8 75	20
5	93	E A Slack	7 50	5
6	94	Leader Printing Company	253 44	6
6	95	Bristol & Knabe	8 50	7
7	96	John Rees	88 88	7
11	97	Minnie E Slaughter	90 00	12
11	98	Callaghan & Company	66 14	21
21	99	Alexander Duffey	216 66	21
22	100	W W Lane	45 00	22
25	101	J E Tuttle	41 40	26
30	102	Robert C Morris	150 00	30
30	103	James D Hopkins	208 33	30
30	104	James D Hopkins	820 98	30
Sept. 1	105	D H Gill	75 00	Sept. 1
4	106	J E Tuttle	12 00	4
4	107	Otto Gramm	75 00	6
4	108	Democratic, Leader	36 00	13
5	109	E A Slack	6 50	5
12	110	Wyoming Stage Company	144 44	16
19	111	Union Pacific Railway Company	21 69	23
19	112	N E Stark	25 60	27
19	113	Jennie Snow	23 80	27
19	114	Pauline Miller	25 60	24
19	115	Kate Phelps	22 00	23
19	116	Estelle Bullock	22 00	27
19	117	Helen McCrum	22 00	27
19	118	Ella M Johnson	22 00	27
19	119	Adela Huffschmidt	22 00	29

Date.	No.	PAYEE.	Amount.	When P'd.
Sept. 19	120	Edith Duffey	$ 24 25	Oct. 3
19	121	Sarah G. Frost	22 00	Sept. 22
19	122	Mary Wheeler	22 00	25
19	123	Kate Davis.	5 40	24
19	124	Mattie A. Thomas	31 00	Nov. 20
19	125	Carrie Liffingwell	22 00	Sept. 20
19	126	Anna Farrell	24 25	27
19	127	A. Louise Vreeland	25 60	22
19	128	Minnie B Dewey	25 60	22
19	129	Lucy S. Merwin	23 80	27
19	130	Anna Forbes	22 00	Oct. 25
19	131	Mamie E. Nowler.	22 00	Sept. 25
19	132	C. L. Wells	11 70	Oct. 15
19	133	A. Ulen.	18 95	7
19	134	Effie L. Jackson	19 85	6
19	135	Flora A. Sherwin	21 10	Nov. 6
19	136	Sada J. Lytle	18 95	Oct. 8
19	137	Mary Jones	14 05	4
19	138	Addie Keegan	20 75	7
19	139	Annie Brockway	19 85	3
19	140	M. C. Lytle	17 15	3
19	141	B. Whiting	19 80	7
19	142	Nellie Quackenbush	18 95	3
19	143	A. B Gibson.	1 80	Dec. 22
19	144	Sadie B. Rudd.	3 50	Oct. 8
19	145	Edwin S. Hallock	7 00	22
19	146	Edith McLeod	7 00	8
19	147	W. C. Moss.	7 00	22
19	148	Clara Scriver	20 70	Nov. 20
20	149	Sweetwater Gazette	2 40	Oct. 29
20	150	Boomerang Publishing Company	12 50	Sept. 27
20	151	Alexander H. Swan	144 42	23
20	152	T. A. Kent	87 50	22
20	155	C. W. Stewart	250 00	20
20	154	Robert C. Morris	250 00	23
20	153	William Hale	85 00	23
20	156	H. Donzelman	25 00	23
25	157	Julia B. Smith	8 55	Oct. 20
25	158	Mrs. F. J. Gardner	8 55	Nov. 10
25	159	M. M. Godat	18 75	Oct. 7
27	160	Buffalo Echo Publishing Co.	1 50	24
29	161	Robert C. Morris	154 20	Sept. 29
Oct. 1	162	Robert C. Morris	150 00	Oct. 1
1	163	Andrew Popp.	15 00	3
1	164	Edward R. Shaw	95 10	8
1	165	G. E. Bailey	100 00	1
1	166	G. E. Bailey	375 00	1
1	167	Union Mercantile Company	73 33	2
1	168	J. D. Hopkins	208 33	1

Date.	No.	PAYEE.	Amount.	When Pd
Oct. 1	169	J D Hopkins	$ 111 30	Oct. 1
3	170	J M Tisdel	68 30	3
3	171	Luke Murrin	5 00	6
3	172	W H B Stout	736 00	11
4	173	John Slaughter	200 00	4
8	174	William Stabach	17 00	15
8	175	Michael Carroll	20 00	15
8	176	Charles Schwatka	19 00	15
8	177	G F Slocum	75 00	15
8	178	W T Shaffer	3 00	11
13	179	Bristol & Knabe	8 00	13
15	180	Gustav Schnitger	92 00	15
15	181	E A Slack	7 56	20
15	182	William F Page	40 00	27
15	183	E P Kelly	37 50	18
15	184	George Berner	169 60	27
15	185	James Davidson	7 00	18
16	185	W A McKenzie	81 95	20
16	187	J W Collins	35 60	18
16	188	George W Hoyt	2 00	17
27	189	Leader Printing Company	9 00	30
	190	*Not Presented*		
27	191	Harvey Allen	77 77	Dec. 3
27	192	C W Stewart	233 32	Oct. 28
28	193	F E Warren Mercantile Company	20 00	28
Nov. 1	194	Robert C Morris	150 00	Nov. 1
1	195	Robert C Morris	38 60	1
1	196	James D Hopkins	208 33	1
1	197	James D Hopkins	85 60	1
1	198	Charles W Stewart	393 50	1
1	199	David Rhode	1,000 00	21
1	200	C W Stewart, for J W Weiser	12 50	3
1	201	C W Stewart, for J W Weiser	12 50	3
1	202	C W Stewart, for J W Weiser	32 15	3
1	203	C W Stewart, for J W Weiser	2 25	3
1	204	C W Stewart, for J W Weiser	1 50	3
1	205	C W Stewart, for J W Weiser	23 60	3
1	206	C W Stewart, for J W Weiser	2 25	3
1	207	C W Stewart, for J W Weiser	308 60	3
5	208	Joseph J LeCain	205 70	11
6	209	Frank M Foote	172 40	12
11	210	D W Gill	150 00	11
11	211	Bristol & Knabe	12 50	17
11	212	William Hale	215 00	15
21	213	F E Warren	100 00	21
14	214	F E Warren	69 00	21
21	215	Cheyenne Op. House and Lib. Co.	250 00	21
22	216	Samuel Aughey	82 50	22
22	217	Samuel Aughey	125 00	22

Date.	No.	PAYEE	Amount.	When Pd
Nov. 22	218	C W Stewart	$ 121 21	Nov. 24
24	219	Bristol & Knabe	5 75	24
24	220	E A Slack	9 50	26
24	221	Leader Publishing Company	150 00	24
25	222	E A Slack	10 00	26
26	223	Bartlett & Rincker	55 57	26
26	224	B F Shaw	75 00	27
Dec. 1	225	Robert C Morris	150 00	Dec. 1
1	226	James D Hopkins	208 34	1
3	227	John Slaughter	56 25	3
3	228	Trabing Brothers	33 33	8
3	229	G F Slocum	75 00	6
3	230	Otto Gramm	75 00	5
3	231	Boomerang Publishing Company	8 40	5
3	232	Boomerang Publishing Company	8 80	5
3	233	William Hale	18 73	5
6	234	Potter & Riner	5 00	11
6	235	Potter & Riner	5 00	11
8	236	Louis Miller	345 70	24
15	237	James D Hopkins	146 95	15
15	238	F Schweikert	43 33	15
15	239	Robert C Morris	11 20	18
15	240	C W Stewart	2 75	16
	241	*Not Presented*		
16	242	G F Slocum	75 00	22
16	243	John W Tanner	113 32	27
16	244	George L Holt	147 77	18
22	245	Charles B Scott	50 63	22
22	246	T Hale	33 33	22
22	247	T Hale and C B Scott	981 60	22
22	248	Perry L Smith	250 00	22
22	249	Donzelman, Stewart & Vanderter	25 00	22
	250	*Not Presented*		
	251	*Not Presented*		
31	253	William Hale	59 00	31
	252	*Not Presented*		
31	254	Robert C Morris	150 00	31
31	255	Samuel Aughey	125 00	31
31	256	Samuel Aughey	83 00	31
31	257	James D Hopkins	208 33	31
31	258	F E Warren	200 00	31
31	259	F E Warren	308 75	31
31	260	F E Warren	100 00	31
		Total warrants paid in 1884	$37,992 06	

The Territory of Wyoming owes no debts, either floating or bonded, and has paid no interest for the four years last past.

The following table shows Treasurer's trial balance, appropriations and their balances December 31, 1884. Also county assessments and balance due from counties for 1884.

BALANCE TABLE.

Account.	Appro'tion	Treasurer's Trial Bal.		Bal. App'n
Appropriated 1882.				
Wyoming Territory			$77,725 91	
Pub. Vol. II Sup. Court records	$ 400 00	$ 350 00		$ 50 00
Veterinarian's salary	5,000 00	4,791 62		208 38
Veterinarian's contingent exp.	3,000 00	1,749 14		1,250 86
Ter. Lib. and S. P. I. salary..	1,600 00	1,600 00		
Care and Transport Ordnance	200 00	166 66		33 34
Expense Fish Commissioner..	1,500 00	1,499 34		66
Clerk Supreme Court.	400 00	92 30		307 70
Supreme Court Judges' salary	2,400 00	2,373 60		26 40
Ter. Librarian's conting't exp.	2,800 00	2,513 61		286 39
Keep and transp'rt of prisoners	22,000 00	18,975 82		3,024 18
Appropriated 1884.				
Tel. about Yellowstone park..	500 00	142 11		357 89
Contingent expense Eighth Legislature, printing, etc...	591 79	552 99		38 80
Special committee to settle with Auditor and Treasurer	221 40	221 40		
Keep and transp'rt of prisoners	18,000 00	2,949 15		15,050 85
Penitentiary commission.....	2,500 00	761 65		1,738 35
Treasurer's salary........ ...	800 00	300 00		500 00
Treasurer's commission.. ...	1,700 00	308 75		1,391 25
Auditor's salary......	2,000 00	750 00		1,250 00
Veterinarian's salary	5,000 00	1,874 99		3,125 01
Governor's contingent exp. .	2,000 00	999 83		1,000 17
Secretary's contingent exp...	1,000 00	471 45		528 55
Auditor's contingent expense.	400 00	106 45		293 55
Treasurer's contingent exp.	400 00	200 00		200 00
Veterinarian's contingent exp	3,000 00	1,526 08		1,473 92
Care and transport ordnance	400 00	87 50		312 50
Geologist's salary............	3,000 00	1,000 00		2,000 00
Geologist's contingent exp...	1,000 00	420 50		579 50
Stenographer's salary........	3,600 00	1,350 00		2,250 00
Stenographer's mileage.....	1,000 00	281 80		718 20
Auditing committee....... . ..	800 00	197 40		602 60
Librarian's salary............	1,600 00	400 00		1,200 00
Librarian's rent and cont. exp	3,000 00	801 60		2,198 40
Library ins'ance and purchase	1,000 00	396 14		603 86
Teacher's institute expense..	1,500 00	738 85		761 15
Clerk's office Supreme Court	800 00	204 70		595 30
Code commission salary......	3,600 00			3,600 00
Clerk code commission salary	800 00			800 00
Code commission stationery..	100 00			100 00
Superintendent of Weights and Measures' salary.......	200 00			200 00
Weights and Measures contingent expense...............	300 00			300 00
Messenger of election returns	500 00			500 00
Relief of J. M. Lobban..... ..	147 09	147 09		

Account.	Appro'tion.	Treasurer's Trial Bal.		Bal. App'm.
1884.				
Distribution of Wyo. reports .	$ 100 00	$ 98 00	$77,725 91	$ 2 00
Relief of Hon. Mike Murphy .	100 00	100 00		
Fish commissioner's cont. exp.	2,000 00	397 29		1,602 71
Fish commissioner's salary . .	600 00	— 150 00		450 00
Fish hatchery house	500 00	462 15		37 85
Insurance commis'nr cont. ex.	600 00	144 89		455 11
Printing Session Laws 1879 . .	700 00	388 10		311 90
Printing School, Election, Stock and Irrigation Laws .	500 00	26 90		473 10
Printing Yellowstone P'rk laws	250 00	178 80		71 20
Yellowstone Park fund .	8,000 00	3,194 49		4,805 51
Cash—General Fund . .		27,102 75		
Cash—Stock Fund . . .		7,694 60		
Stock Indemnity Fund . .		1,905 31		
1884.	Assess'm't.		Am't p'd in.	Bal. Ass'm't
Albany County, regular General Fund tax	$ 3,246 21		$ 3,246 21	
Albany County, regular Stock Fund tax	971 44		971 44	
Carbon County, regular General Fund tax	3,002 29		3,002 29	
Carbon County, regular Stock Fund tax	1,271 59		1,271 59	
Johnson County, regular General Fund tax	2,453 63		2,453 63	
Johnson County, additional General Fund tax . .	57 22			57 22
Johnson County, additional Stock Fund tax	37 74			37 74
Johnson County, regular Stock Fund tax	1,469 55		1,469 55	
Sweetwater County, regular General Fund tax	1,592 50		1,592 50	
Sweetwater County, regular Stock Fund tax	149 56		149 56	
Uinta County, regular General Fund tax	1,674 11		1,163 12	510 99
Uinta County, regular Stock Fund tax	236 26		100 00	136 26
Fremont County, regular General Fund tax	1,275 36			1,275 36
Fremont County, regular Stock Fund tax	785 72			785 72
Laramie County, regular General Fund tax	6,372 91			6,372 91
Laramie County, regular Stock Fund tax	2,389 07			2,389 07
	$26,985 16	$93,145 80	$93,145 80	$11,565 27

DEDUCTIONS FROM PRECEDING TABLES.

Total assessment Territorial tax 1884—		
Regular, Stock Indemnity and additional . . .		$26,985 16
Received on above assessment	$15,419 89	
Balance due on above assessment	11,565 27	
	$26,985 16	$26,985 16
Total appropriations of 1884		$78,841 65
Additional appropriations, fees in Yellowstone Park fund		17 50
Appropriations paid and charged out March 31, 1884	$ 4,013 37	
Appropriations reverted into treasury March 31, 1884, account of printing Governor's message and Territorial officers' reports	18 00	
Paid on appropriations of 1884 (not thrown out) . .	22,348 55	
Balance (actual $52,461,73+additional $17.50)= . .	52,479 23	
	$78,859 15	$78,859 15

Respectfully submitted,
F. E. WARREN,
Territorial Treasurer.

REPORT OF TERRITORIAL TREASURER

TERRITORIAL TREASURER'S OFFICE,
CHEYENNE, WYOMING,
JANUARY 1, 1886.

To His Excellency, Governor Francis E. Warren:

SIR:—In compliance with section two (2), chapter forty-seven (47), Session Laws of 1882, I have the honor to submit the following report of the transactions of this department since the close of business, December 31, 1884, up to and including December 31, 1885.

Very Respectfully,
Your Obedient Servant,
W. P. GANNETT,
Territorial Treasurer.

CASH STATEMENT.

Balance in Treasury December 31, 1884:		
General Fund	$27,102 75	
Stock Indemnity Fund	7,694 60	$34,797 35

RECEIVED IN 1885.

Yellowstone National Park—		
June 17, 1885, Chas. H. Hall, J. P., fines	10 00	
August 17, 1885, Chas. H. Hall, J. P., fines	28 75	
September 24, 1885, Chas. H. Hall, J. P., fines	27 50	
November 20, 1885, M. E. Metcalf, J. P., fines	92 50	158 75
Weights and Measures—General Fund		
July 11, 1885, Carbon County	230 00	
July 11, 1885, Albany County	379 00	609 00
Albany County—		
November 13, 1885, account General tax, 1885	3,000 00	
December 12, 1885, account of General tax, 1885	1,197 81	
December 12, 1885, account of Stock Indemnity tax, 1885	892 39	5,090 20
Crook County—		
December 19, 1885, account of General tax, 1885	1,500 00	
December 19, 1885, account of Stock Indemnity tax, 1885	850 00	2,350 00
Fremont County—		
January 8, 1885, balance of General tax, 1884	1,275 36	
January 8, 1885, balance of Stock Indemnity tax, 1884	785 72	2,061 08
Johnson County—		
January 6, 1885, balance additional General tax, 1884	57 23	
January 6, 1885, balance additional Stock Indemnity tax, 1884	37 74	
November 18, 1885, account of General tax, 1885	3,500 00	
November 18, 1885, account of Stock Indemnity tax, 1885	1,500 00	5,094 97

Laramie County—		
January 15, 1885, balance General tax, 1884	6,283 86	
January 15, 1885, balance Stock Indemnity tax, 1884	2,371 00	
January 15, 1885, delinquent tax 1877,	11 57	
" " " 1878,	8 81	
" " " 1879,	16 59	
" " " 1880,	19 06	
" " " 1881,	19 70	
December 19, 1885, account of General tax, 1885	5,500 00	
December 19, 1885, account of Stock Indemnity tax, 1885	1,500 00	15,730 56
Sweetwater County—		
December 29, 1885, account of General tax, 1885	2,421 33	
December 29, 1885, account of Stock Indemnity tax, 1885	254 15	2,675 48
Uinta County—		
January 2, 1885, balance General tax, 1884	496 38	
January 2, 1885, balance Stock Indemnity tax, 1884	127 67	624 05
		$69,191 44

DISBURSEMENTS FOR 1885.

APPROPRIATIONS OF 1882.

Brought forward	$69,191 44	
Care and transportation of ordnance		33 34
Stock Indemnity Fund		2,092 04

APPROPRIATIONS OF 1884.

Telegrams about Yellowstone National Park . . .	13 80
Keep and transport of prisoners	6,989 29
Penitentiary Commission	1,036 65
Treasurer's salary	400 00
Treasurer's commission	687 87
Auditor's salary	1,000 00
Veterinarian's salary	2,500 01
Governor's contingent expense	1,000 17
Secretary's contingent expense	510 56
Auditor's contingent expense	239 48
Treasurer's contingent expense	182 75

Veterinarian's contingent expense			1,473 92
Care and transportation of ordnance			157 00
Geologist's salary			1,562 50
Geologist's contingent expense			579 50
Stenographer's salary			1,650 00
Stenographer's mileage			408 00
Auditing committee			350 80
Librarian's salary			800 00
Library rent and contingent expense			1,213 03
Library insurance and purchase			330 00
Teacher's institute expense			499 23
Clerk's office, Supreme court			460 15
Code Commission's salary			3,600 00
Clerk Code Commission's salary			800 00
Code Commission stationery			99 50
Superintendent Weights and Measures' salary			100 00
Weights and Measures' contingent expense			228 30
Fish Commissioner's contingent expense			1,386 88
Fish Commissioner's salary			300 00
Fish hatchery house			34 45
Insurance Commissioner's contingent expense			110 00
School, Election, Stock and Irrigation Laws			450.00
Weights and Measures—General Fund			1,069 00
Yellowstone Park Fund			3,667 77
Cash balance on hand December 31, 1885:			
General Fund	$17,254 22		
Stock Indemnity Fund	13,921 23		31,175 45
		$69,191 44	$69,191 44

CASH.

Balance on hand December 31, 1884	$34,797 35	
Received from all sources in 1885	34,394 09	
Disbursements in 1885 for all purposes		$38,015 99
Balance on hand December 31, 1885		31,175 45
	$69,191 44	$69,191 44

CASH—STOCK FUND.

Balance December 31, 1884	$ 7,694 60	
Received in 1885	8,318 67	
Disbursed in 1885		$ 2,092 04
Balance on hand December 31, 1885		13,921 23
	$16,013 27	$16,013 27

CASH—General Fund.

Balance December 31, 1884	$27,102 75	
Received in 1885	26,075 42	
Disbursed in 1885		$35,923 95
Balance on hand December 31, 1885		17,254 22
	$53,178 17	$53,178 17

TERRITORIAL TREASURER'S TRIAL BALANCE, DECEMBER 31, 1885.

Stock Indemnity Fund—Cash	$13,921 23	
Stock Indemnity Fund (disbursed)	3,997 35	
Albany County—		
Account of General Fund		$ 4,197 81
Account of Stock Fund		892 39
Johnson County—		
Account of General Fund		3,500 00
Account of Stock Fund		1,500 00
Laramie County—		
Account of General Fund		5,500 00
Account of Stock Fund		1,500 00
Sweetwater County—		
Account of General Fund		2,421 33
Account of Stock Fund		254 15
Crook County—		
Account of General Fund		1,500 00
Account of Stock Fund		850 00
Telegrams about Yellowstone National Park	155 91	
Contingent expense of Eighth Legislature, printing, etc	552 99	
Keep and transport of prisoners	9,938 44	
Penitentiary commission	1,798 30	
Treasurer's salary	700 00	
Treasurer's commission	996 62	
Auditor's salary	1,750 00	
Veterinarian's salary	4,375 00	
Governor's contingent expense	2,000 00	
Secretary's contingent expense	982 01	
Auditor's contingent expense	345 93	
Treasurer's contingent expense	382 75	
Veterinarian's contingent expense	3,000 00	
Care and transport of ordnance	244 50	
Geologist's, etc., salary	2,562 50	

Geologist's contingent expense, (rent)	1,000 00	
Stenographer's salary	3,000 00	
Stenographer's mileage	689 80	
Auditing committee	548 20	
Librarian's salary	1,200 00	
Librarian's rent and contingent expense	2,014 63	
Library insurance and purchase	726 14	
Teacher's institute expense	1,238 08	
Clerk's office, Supreme court	664 85	
Code Commission's salary	3,600 00	
Clerk Code Commission's salary	800 00	
Code Commission's stationery	99 50	
Superintendent Weights and Measures' salary	100 00	
Weights and Measures' contingent expense	228 30	
Distributing Wyoming reports	98 00	
Fish Commission contingent expense	1,784 17	
Fish Commissioner's salary	450 00	
Fish hatchery house	496 60	
Insurance Commissioner's contingent expense	254 89	
Printing Session Laws of 1879	388 10	
Printing school, election, stock and irrigation laws,	481 90	
Printing Yellowstone National Park laws	173 80	
Weights and Measures—General Fund	460.00	
Wyoming Territory		70,042 54
Cash—General Fund	17,254 22	
Yellowstone Park fund	6,703 51	
	$92,158 22	$92,158 22

WARRANTS PAID IN 1885.

Date.		No.	PAYEE.	Amount.	When Pd	
1884					1885	
April	15	15	L. Murrin	$ 10 00	Nov.	30
Dec.	16	241	Otto Gramm	7 85	Jan.	2
	30	250	Otto Gramm	10 45		6
	30	251	G. F. Slocum	75 00		2
	30	252	Chas. Schwattke	20 00		6
1885						
Jan.	2	261	John Slaughter	200 00		2
	3	262	Opera House Company	250 00		3
	12	263	E. A. Slack	450 00		12
	12	264	E. A. Slack	25 00		12
	12	265	Bristol & Knabe	7 50		12
	14	266	W. H. B. Stout	701 20		30
	14	267	G. I. Vickery, sheriff	412 25		26
	14	268	Gustave Schnitger	51 00		20
	14	269	S. K. Sharpless, sheriff	465 65		19
	14	270	L. Murrin	35 00		23
	14	271	J. M. Tisdel	75 55		23
	14	272	F. M. Foote	97 40		26
	17	271	Charles B. Scott	33 33		17
	17	274	T. Hale	33 33		19
	17	275	C. W. Stewart	101 50		19
	17	276	Mrs. Francis E. Hale	360 00		21
	17	277	D. W. Gill	150 00		21
	17	278	C. W. Stewart	33 34		19
	17	279	C. W. Stewart	82 00		19
	17	280	C. W. Stewart	250 00		19
	17	281	James J. LeCain	67 80		26
	19	282	F. M. Canton	542 05		30
	20	283	Samuel Aughey	101 35		21
	20	284	Samuel Aughey	125 00		21
	20	284	C. E. Clay	94 44		23
	20	286	C. W. Stewart	50 00		20
	22	287	George G. Masten	10 00		22
	22	288	W. M. Masi	9 25		22
	23	289	Western Union Telegraph Co	4 77		24
	23	290	F. E. Warren	69 00		23
	23	291	F. E. Warren	230 21		23
	26	292	M. P. Keefe	30 90		26
	27	293	F. E. Warren	127 75		27
	31	294	Robert C. Morris	150 00		31
	31	295	Henry Wagner	3 95	Feb.	4
	31	296	George Hull	7 50		3
	31	297	N. Thies & Co	3 00		3
	31	298	Otto Gramm	75 00		3
	31	299	G. F. Slocum	75 00		3
	31	300	Otto Gramm	13 00		3
	31	301	E. O. Chase	14 00		16
	31	302	Samuel Aughey	62 50	Jan.	31
Feb.	3	303	D. W. Gill	75 00	Feb.	3

Date.	No.	PAYEE.	Amount.	When Pd
Feb. 3	304	E. A. Slack	$ 36 55	Feb. 4
3	305	E. A. Slack	5 00	4
5	306	Leader Printing Company . .	17 55	20
6	307	W. W. Corlett	10 00	7
10	308	J. W. Jones	1 50	10
12	309	Otto Gramm	13 25	19
12	310	D. H. Budlong	159 00	27
12	311	The Tribune Company	5 50	16
13	312	Cheyenne Transfer Company .	20 00	13
14	313	Moore & Stephens	8 00	14
14	314	Knadler & Rand	11 50	19
23	315	T. F. Dolan	5 00	23
24	316	C. W. Parker	200 00	Mar. 10
24	317	G. F. Slocum	75 00	7
26	318	R. S. Van Tassell	42 00	7
27	319	C. W. Stewart	58 33	Feb. 27
27	320	Chas. B. Scott	153 00	Mar. 13
28	321	Samuel Aughey	125 00	Feb. 28
28	322	Samuel Aughey	66 00	28
28	323	D. W. Gill	75 00	28
28	324	H. L. Silf	4 00	Mar. 7
Mar. 2	325	Robert C. Morris	150 00	7
2	326	W. M. Masi	4 55	7
5	327	J. W. Jones	10 00	7
6	328	H. V. S. Groesbeck . .	25 10	7
7	329	A. V. Quinn	140 30	7
7	330	C. W. Stewart	132 84	7
9	331	F. E. Warren	66 65	9
12	332	Trevanian Hale	122 20	30
13	333	Harry Oelrich	72 00	13
23	334	Shaw & Son	40 00	31
23	335	Shaw & Son	55 00	31
24	336	Otto Gramm	7 50	25
24	337	C. W. Stewart	50 00	25
31	338	Wm. P. Gannett	33 35	31
31	339	James D. Hopkins	625 00	31
31	340	James D. Hopkins	304 75	31
31	341	C.W. Stewart for S.M. Fitzgerald	20 50	31
31	342	C. W. Stewart	30 00	31
April 1	343	A. V. Quinn	148 30	April 1
1	344	H. V. S. Groesbeck	37 10	1
	345	*Not presented.*		
1	346	Robert C. Morris	150 00	1
1	347	Robert C. Morris	11 20	1
2	348	John Slaughter	100 00	2
2	349	John Slaughter	200 00	2
2	350	Cheyenne Opera House Co . .	250 00	2
2	351	D. W. Gill	75 00	2
2	352	Stock Growers' Nat'l Bank . .	100 00	7

Date.	No.	PAYEE.	Amount.	When P'd.
April 4	353	Cheyenne Gas company	$ 12 96	April 7
4	354	F. E. Warren	50 00	4
6	355	E. A. Slack	26 00	6
6	356	R. S. Vantassell	43 90	9
6	357	F. E. Warren	46 00	6
7	358	L. Murrin	12 35	7
7	359	James M. Tisdel	68 30	7
7	360	Frank M. Foote	97 40	7
7	361	W. H. B. Stout	623 60	13
8	362	John Slaughter	89 15	8
10	363	Samuel Aughey	125 00	10
10	364	" "	48 00	10
11	365	M. E. Metcalf	61 60	27
11	366	T. Hale	33 33	23
11	367	Charles B. Scott	33 33	25
14	368	S. M. Fitzgerald	179 40	14
14	369	" "	179 40	14
14	370	" "	179 40	14
14	371	" "	171 40	14
14	372	" "	171 40	14
15	373	J. C. Baird	15 00	23
15	374	C. N. Potter	15 00	16
15	375	G. F. Slocum	137 50	18
15	376	Otto Gramm	20 12	18
18	377	" "	75 00	21
18	378	B. Hellman & Co.	5 50	21
18	379	Western Union Telegraph Co	8 42	23
20	380	J. J. LeCain	124 20	27
22	381	R. C. Morris	88 20	23
24	382	T. A. Kent	82 50	24
24	383	D. H. Budlong	50 00	May 7
24	384	M. E. Metcalf	25 00	11
27	385	James A. Clark	41 10	18
May 1	386	H. S. Oliver	96 25	1
1	387	E. A. Slack	5 00	2
1	388	James D. Hopkins	208 34	1
1	389	" "	77 28	1
2	390	E. A. Slack	150 00	2
4	391	Riner & Johnson	41 25	9
4	392	Perry L. Smith	83 33	4
4	393	C. W. Stewart	10 00	4
5	394	Cheyenne City Gas company	10 80	5
5	395	Samuel Aughey	65 75	5
5	396	" "	125 00	5
6	397	Fred Hagerman	66 66	6
6	398	S. B. Tuttle	55 00	6
12	399	J. W. Jones	8 50	13
12	400	C. B. Scott	33 33	June 1
12	401	Trevanian Hale	33 33	1

Date.		No.	PAYEE	Amount.	When Pd	
May	12	402	M. E. Metcalf.	25 00	June	1
	22	403	Bristol & Krabe	17 50		23
	23	404	Cu leworth & Osterm	40 00		1
	23	405	Milo Kendall	17 00		11
	25	406	Robert C. Morris	104 60	May	25
	2	407	D. W. Gill.	75 00		26
	2	408	F. E. Warren	140 10		29
	2	409	Ringe & Johnson	55 00	June	3
June	1	410	M. E. Post & Co.	90 00		1
	1	411	F. E. Warren Mercantile Co. .	14 00		1
	1	412	James D. Hopkins	84 25		1
	1	413	" "	2 31		1
	1	414	Robert C. Morris	150 00		1
	1	415	Samuel Aughey	125 00		1
	1	416	" "	19 00		1
	2	417	R. B. Horr	40 00		2
	5	418	Cheyenne City Gas company .	8 90		9
	8	419	D. W. Gill.	55 28		8
	11	420	C. W. Stewart	83 33		12
	11	421	" "	10 00		12
	13	422	Henry Treamer	155 00	July	6
	13	423	" "	230 00		6
	15	424	D. H. Bradbury	100 00	June	27
	15	425	C. B. Scott.	33 33		27
	15	426	M. E. Metcalf.	25 00		27
	17	427	Henry Ohlson	30 00		27
	18	428	L. W. Jackson	80 83	Sept.	18
	18	429	C. W. Ladd.	16 17		18
	2	430	" "	27 00	July	6
	2	431	W. A. Johnson.	164 04	June	24
	26	432	Western Union Telegraph Co.	2 38	July	6
July	1	433	R. B. Horr	40 00		1
	1	434	Rocky Mt. Bell Telephone Co.	24 00		1
	1	435	Samuel Aughey	125 00		1
	1	436	" "	12 00		1
	1	437	Robert C. Morris	150 00		1
	1	438	F. E. Warren.	50 00		3
	1	439	W. P. Garrett	100 00		1
	2	440	Cheyenne Opera House Co . .	250 00		1
	2	441	A. C. Snyder	3 00		2
	2	442	M. P. K	42 00		2
	3	443	Fairbanks & Co	272 50		8
	3	444	John Slaughter.	200 00		3
	3	445	James D. Hopkins	187 75		3
	3	446	" "	2 8 74		3
	6	447	The Leader	6 00		6
	6	448	Perry L. Smith	83 24		6
	7	449	E. A. Sl	7 50		7
	10	450	Chas. B. Scott	33 33		27

Date		No.	PAYEE.	Amount.	When Pd.	
July	10	451	C W Stewart	$ 10 00	July	11
	11	452	Zehner, Jackson & Buechner	6 50		11
	11	453	Joseph LeCain	504 40		17
	21	454	N N Craig	270 80		21
	21	455	Joseph Young	189 70	Sept.	4
	21	456	W H B Stout	558 80		27
	21	457	J M Tisdel	67 55	July	25
	21	458	Frank M Foote	98 15	Aug.	1
	21	459	Leader Printing company	8 00	July	24
	21	460	George L Holt	15 95		21
	21	461	G F Slocum	225 00		24
	21	462	Otto Gramm	75 00		24
	24	463	W W Corlett	1,200 00	Dec.	15
	24	464	J P Caldwell	1,200 00	July	27
	24	465	Clarence D Clark	1,200 00	Aug.	6
	24	466	Wm J McIntyre	800 00	July	28
	24	467	" "	12 75		28
	24	468	Otto Gramm	86 75		20
	24	469	D H Budlong	100 00	Aug.	6
	24	470	Chas H Hall	25 00		15
	27	471	L Murrin	128 65	July	27
	27	472	Mrs C Weybrecht, adminis'tor.	4 00	Aug.	6
	28	473	M E Post	13 80	July	28
	29	474	Perry L Smith	83 33		29
	29	475	M E Metcalf	25 00	Aug.	21
Aug.	3	476	Robert C Morris	150 00		3
	4	477	James D Hopkins	208 33		4
	4	478	" "	124 10		4
	4	479	Western Union Telegraph Co.	3 05		12
	5	480	Idelman Brothers	265 30		5
	6	481	James D Hopkins	135 00		6
	7	482	G F Slocum	37 50		15
	7	483	" "	26 76		15
	7	484	John Bernstein	12 50		26
	7	485	Otto Gramm	10 75		26
	8	486	Samuel Aughey	69 50		10
	8	487	" "	125 00		10
	8	488	A C Snyder	10 00		8
	10	489	C B Scott	33 33		27
	10	490	Trevanian Hale	66 67	Oct.	3
	11	491	M E Metcalf	25 00	Aug.	27
	11	492	Chas H Hall	25 00	Sept.	24
	15	493	S B Tuttle	50 00	Aug.	15
	15	494	C W Stewart	10 00		15
	15	495	" "	35 00		15
	15	496	Martin Goodsell	50 00		26
	24	497	Cheyenne City Gas company	7 55		24
	25	498	George Zimmerman	20 00	Oct.	9
Sept.	1	499	Morton E Post	90 00	Sept.	1

Date.		No.	PAYEE.	Amount	When Pd.	
Sept	1	500	James D Hopkins	$ 208 33	Sept.	1
	1	501	" "	109 10		1
	1	502	Robert C Morris	150 00		1
	1	503	Samuel Aughey	51 50		1
	1	504	" "	125 00		1
	2	505	Henry Troemnerm	460 00		12
	2	506	E A Slack	3 75		7
	2	507	C W Stewart	10 00		3
	2	508	Perry L Smith	83 33		3
	3	509	Mattie A Thomas	6 00		4
	4	510	Mrs A B Tisdel	88 20		4
	4	511	M C Lytle	48 90		4
	4	512	E S Halleck	191 00		4
	4	513	C L Wells	118 53		4
	5	514	Lillie M Thomas	5 20		5
	5	515	Mary E Ellis	13 00		5
	5	516	Mrs A B Tisdel	21 40		5
	5	517	Mary Lyon	7 00		11
	5	518	T Hale	33 33		28
	5	519	A S Peabody	5 20	Oct.	6
	9	520	Merritt E Metcalf	25 00		5
	9	521	Chas H Hall	25 00		2
	9	522	Chas B Scott	33 33		5
	11	523	James B Rankin	164 55	Sept.	12
	14	524	Trevanian Hale	33 33	Oct.	2
	14	525	G F Slocum	75 00	Sept.	18
	15	526	B Turpin	60 00		15
	21	527	Robert C Morris	88 20	Oct.	21
	22	527	Chas B Scott	28 75		26
	21	528	Bristol & Knabe	18 00	Sept.	21
	23	528	John Slaughter	27 30		23
	24	529	H G Hay, cashier	83 33		25
	24	530	John Slaughter	36 93		24
	29	531	Chas C Hall	8 50	Nov.	2
Oct.	1	532	James D Hopkins	208 33	Oct.	1
	1	533	" "	151 75		1
	1	534	W P Gannett	100 00		2
	1	535	John Slaughter	200 00		1
	2	536	E A Slack	150 00		2
	5	537	T Hale	33 33		26
	5	538	P L Smith	83 33		5
	5	539	C W Stewart	10 00		5
	6	540	Cheyenne Opera House Co	250 00		6
	6	541	Samuel Aughey	125 00		6
	6	542	" "	68 00		6
	7	543	Otto Gramm	75 00		9
	7	544	Dennis Ryan	6 50		9
	7	545	G F Slocum	75 00		[illegible]
	8	546	Idelman Brothers	75 00		8

Date.	No.	PAYEE.	Amount.	When Pd
Oct. 9	547	W H B Stout	$ 396 00	Oct. 15
9	548	Frank M Canton	339 15	16
9	549	Chas B Scott	33 33	26
9	550	Trevanian Hale	244 50	Nov. 2
13	551	A J Parshall	66 67	Oct. 13
13	552	F H Harrison	83 33	21
14	553	M E Metcalf	25 00	Nov. 20
14	554	Chas H Hall	25 00	20
28	555	E A Slack	104 60	Oct. 28
31	556	Perry L Smith	83 33	31
31	557	C W Stewart	10 00	31
31	558	Edward W Gardner	476 67	Nov. 5
Nov. 2	559	Robert C Morris	150 00	2
2	560	James D Hopkins	208 34	2
2	561	" "	110 65	2
2	562	W M Masi	1 75	25
2	563	Samuel Aughey	125 00	2
2	564	" "	48 40	2
10	565	Michael Henry	100 00	10
10	566	James Fenton	18 88	10
14	567	O'Brien & Wallace	140 00	Dec. 1
14	568	E H Becker	6 00	Nov. 30
16	569	Boomerang Publishing Co . .	2 25	20
16	570	M W Pettigrew	2 80	Dec. 2
16	571	Tribune Publishing Co	3 00	Nov. 23
17	572	F Hale	33 33	Dec. 18
17	573	Chas B Scott	33 33	19
17	574	J M Tisdel	67 55	Nov. 17
17	575	F M Foote	97 40	25
17	576	L Murrin	10 00	Dec. 28
18	577	F E Warren Mercantile Co . .	25 00	Nov. 18
18	578	" " " . .	15 90	18
20	579	J K McGuire . . .	42 00	20
20	580	John Emerson	45 10	Dec. 5
20	581	J J LeCain	291 90	Nov. 27
	582	*Not presented.*		
28	583	B Turpin	65 63	Nov. 28
Dec. 1	584	M E Post & Co.	90 00	Dec. 1
1	585	James D Hopkins	119 80	1
1	586	" "	208 33	1
1	587	Robert C Morris	150 00	1
1	588	" "	11 20	1
1	589	George F Slocum	75 00	4
1	590	Mountain Publishing company.	4 00	14
1	591	M E Metcalf	25 00	24
1	592	Chas H Hall	25 00	19
2	593	Fisher & Co	90 67	3
3	594	Perry L Smith	83 33	3
3	595	C W Stewart	10 00	3

Date.	No.	PAYEE.	Amount	When P'd.
Dec. 8	596	Samuel Aughey	$ 125 00	Dec. 8
12	597	Isaac Greentree	122 22	12
12	598	J J LeCain	63 00	16
16	599	Powder River Cattle company.	313 33	16
22	600	G A Draper	51 11	22
24	601	Bristol & Knabe	17 50	24
	602	*Not presented.*		
	603	" "		
	604	" "		
	605	" "		
	606	" "		
	607	" "		
	608	" "		
28	609	L Murrin	138 35	Dec. 28
28	610	N N Craig	502 35	28
28	611	W A Jameson	545 65	30
31	612	Perry L Smith, Auditor	83 35	31
31	613	Wm P Gannett, Ter. Treasurer	457 65	31
31	614	" " "	100 00	31
31	615	James D Hopkins.	208 33	31
31	616	" "	69 49	31
	617	*Not presented.*		
31	618	Samuel Aughey	125 00	31
		Total warrants paid	$38,015 99	

TOTAL ASSESSMENT TERRITORIAL TAX 1885.

All funds		$39,515 88
Received on same	$22,115 68	
Balance due from counties on same	17,400 20	
	$39,515 88	$39,515 88
Counties assessed for General Fund, 1885		$30,717 25
Received on this fund 1885	$17,119 14	
Balance due in this fund 1885	13,598 11	
	$30,717 25	$30,717 25
Counties assessed for Stock Indemnity Fund 1885		$8,798 63
Received on this fund 1885	$4,996 54	
Balance due in this fund 1885	3,802 09	
	$8,798 63	$8,798 63

DIVISION OF DISBURSEMENTS IN 1885.

Total disbursements 1885		$38,015 99
Paid on account of Weights and Measures, no appropriation	$ 1,069 00	
Paid on account of appropriations of 1882	33 34	
Paid on account of Stock Indemnity Fund, no appropriation	2,092 04	
Paid on account of appropriations of 1884	34,821 61	
	$38,015 99	$38,015 99
Total appropriations of 1884		$78,841 65
Paid on appropriations in 1884	$26,361 92	
Reverted appropriations in 1884	18 00	
Paid on appropriations in 1885	34,821 61	
Balance appropriations, January 1, 1886	17,640 12	
	$78,841 65	$78,841 65
Balance of appropriations of 1884, January 1, 1886		$17,640 12
Additional received from Yellowstone National Park in 1884		17 50
Additional received from Yellowstone National Park in 1885		158 75
Balance of 1884 appropriations and additions January 1, 1886		$17,816 37

ITEMS.

Cash balance in General Fund December 31, 1885	$17,254 22
Balance appropriations of 1884, unpaid together with additions to same funds	17,816 37
Excess of appropriations over cash balance	562 15
Balance due from counties on account of General Fund, taxes of 1885	13,598 11
Available funds for new appropriations by Ninth Legislature	13,035 96

[To this last sum will be added taxes of 1886, when collected from various counties the latter part of 1886 or before January 15, 1887. In arriving at the available assets of the Territory for the two years next ensuing, there should also be added unexpended balances in appropriations March 31, 1886].

Wyoming Territory has no indebtedness, and has paid no interest for the last five years.

I wish to thank the various County Treasurers for the promptness with which they have turned over moneys due this office for Territorial taxes.

The transactions of the office have been satisfactory and pleasant, and in conclusion I desire to congratulate the Territory on its past and present prosperous condition and its bright prospects.

Respectfully submitted,
W. P. GANNETT,
Territorial Treasurer.

REPORT OF TERRITORIAL GEOLOGIST.

To His Excellency, Governor Francis E. Warren:

DEAR SIR:—In accordance with the statutes of Wyoming Territory, I have the honor to transmit to you herewith the following report of the work done by me during the time that I have filled the office of territorial geologist, up to January 1, 1886. It embraces the following:

1. Statement of the work done by the territorial geologist.
2. Condition of the mining industry in the territory.
3. Report on the iron ore bodies in Wyoming.
4. Report on the oil fields in Wyoming.
5. List of the minerals in Wyoming.

I have aimed to be as free as possible from technical methods. My endeavor has been to address the general reader rather than the special investigator. A report on the coal fields and soda deposits is in progress, but another season's work will be required to complete it.

Very respectfully,
SAMUEL AUGHEY,
Territorial Geologist.

At my appointment as territorial geologist by Governor Hale, I was instructed to use my utmost endeavors to secure the development of the mineral resources of the territory, and to that end to give such directions and such information as the work required. Owing to the fact that the office had been vacant for some time, a large amount of work had accumulated. A portion of this work was the examination of ores sent in by miners who were anxious to know whether their claims were prospectively of any account. This led me to put the assaying material in order, and to supplement it by such additions as were necessary in order to do exact work. Up to this time the number of assays made during my incumbency is 639. Some of the specimens to be assayed came from the Big Horn, Seminoe and Ferris Mountains, Miner's Delight, Silver Crown Districts and other points. Being constantly called into the field to examine mining property, I employed at my own expense Wilber C. Knight, a former student of mine, during the summer of 1885, to keep the office open during my absence and to do such assay work as was required. In addition to such office work he also went into the field during the time when I could be in Cheyenne myself. He performed the work entrusted to him with fidelity and to the satisfaction of those by whom he was employed. This arrangement added greatly to the efficiency of the office. During the second week of October Mr. Knight returned to the University of Nebraska to complete his studies. Finding myself still crowded, on the 9th of December I employed Elbert T. Wood, Esq., to take charge of the assay department and to keep the office open during the days when I was necessarily absent engaged in outside duties. His training and ability also adds greatly to the efficiency of the office at the present time.

During the year I have examined over 100 mining prospects, the most of them being in the Silver Crown, Seminole or Ferris Mining Districts. I have given such instruction in each case as those interested needed, and I was capable of giving. Only two detailed reports were made, one on the King David mine in Silver Crown, and the other on the King mine on the Seminoe Mountain. Neither of these were placed on the stock boards, or were sufficiently developed for that purpose.

During the year I was most frequently asked for information in regard to the condition and extent of the oil territory of Wyoming. I made a detailed examination of the Powder River, Big Horn, Rattle Snake, Brago and Seminole oil basins. To satisfy the demand for information on this subject I have prepared a detailed report of the principal oil belt of the territory, which is included under another head. Into that report I have embodied all the facts on this subject gathered in previous years.

As much interest has been manifested in iron ores, a thorough examination was made of the iron ore deposits at the base of Bradley's Peak, on Seminoe Mountain, the results of which are also embodied in this report. It was deemed important to do this, inasmuch as that deposit is one of the finest of the kind in the world. A large number of additional notes were made of our coal deposits, and these will be embodied in a report during the next season.

Owing to the great extent of our territory I have not been able to visit all the mining camps which claimed attention. They will, however, be examined in detail, and during another year such as have not been seen will be visited, and the facts concerning their character and prospective importance reported upon.

During my work in the field I have missed no opportunity of collecting fossils and minerals for a territorial museum. The rooms of the territorial geologist are too much crowded to exhibit these at present, but they will be in order at the earliest possible date. The work in economic geology has so taken up my time that little could be spared for work on the materials for a museum. But in connection with the work in economic geology, several thousand specimens in mineralogy and paleontology have been collected.

NEEDS OF THE OFFICE.

During much of the time the territorial geologist is necessarily absent from his office, engaged in field work. It would more than double the efficiency of the office if provision were made for an assistant, who could keep the office open during the necessary absence of the territorial geologist, and under his direction should mount the minerals and fossils that are now boxed, and that may be collected during the season, in suitable cases for the museum. Such assistant might also do any assay work required, and turn the proceeds into the territorial treasury.

When I entered upon the duties of this office a portion of the contingent fund had already been legitimately expended. Out of this fund the rent of the territorial geologist's office and the room for the storage of the assay apparatus of the territory is paid. In order to be able to give a correct judgment of mining prospects, I fitted up the assay apparatus and supplemented it by new apparatus to take the place of that which was worn out, in order to be able to make assays of minerals when they should be necessary. The means to do that was taken out of the contingent fund. To carry on the office efficiently, and to utilize the mineral and fossil collections, cases with glass doors and sides should be provided, the cost of which would amount to an estimated cost of five hundred dollars. An additional room should also be rented to be devoted exclusively to the purposes of a museum. Properly to utilize the collections that have been made, the providing of the necessary cases, the renting of an additional large room for museum purposes, and defraying the additional expenses for transportation of packages of minerals, etc., would require the increase of the contingent fund of one thousand dollars, allowed by the legislature of two years ago, to eighteen hundred dollars. The importance of museum work can be seen from this that rare minerals and fossils abound here as nowhere else. Wyoming is the principal collecting ground for the scientific men of the nation, but comparatively little has yet been done to secure or save these educational treasures for ourselves.

CONDITION OF THE MINING INDUSTRY IN WYOMING.

The best developed mining interest in Wyoming is the coal industry. The fact that the Union Pacific Railway transports daily from Wyoming over 3,000 tons of coal needs no comment. It supplies the increasing dense populations along the line of their road in Nebraska with fuel. There is a constantly increasing consumption in Wyoming itself. When the railroad now aiming for Wyoming through Northern Nebraska reaches the Territory, five hundred more miles of road must be supplied from our coal fields. Coal beds have been opened for the first time during the last year in many places, among which are banks near the Rattlesnake and Beaver oil basins, to drive the machinery used in boring for petroleum, and on the south side of the Seminoe Mountain, to work the gold mines there.

The subject of the development of the oil basins is discussed in another connection.

SILVER CROWN DISTRICT.

A great deal of prospect work has been done in this camp at different times for many years past. The only property, however, that has been developed sufficiently to be called a mine is the Copper King and associated lodes. It is an immense lead, the ore body being over three hundred feet in width and two thousand six hundred feet in length. At the surface it is mainly low grade, running less than one per cent. in copper. It regularly improves in grade with depth. It has a shaft one hundred and thirty feet deep. On the lower level on the north side, some twenty feet from the shaft, there is a winze. Here there is a pay streak eight feet wide that runs, from an average of many assays, about eleven per cent of copper and nearly two and a half ounces of gold. The ore is rich beyond the pay streak to the end of this cross drift. In the eighty-foot level above this same streak occurs. The ore is made up of copper pyrites, oxides, especially the sub-oxides, in flakes and metallic copper. The pyrites increase greatly from the eighty-foot level to the bottom of the shaft. A little carbonate and barite and other ores of copper also occur. Owing to causes not connected with the ore bodies, this property is not worked at present.

The King David mine, on a tributary of North Crow Creek, has been considerably prospected during the first half of the year. The ore is mainly copper glance, but occasionally copper pyrites, barite, covellite, oxide, gray copper and other forms of copper ore appear. It is a remarkably good prospect. Unfortunately the mistake was made of putting up a smelter before the property was sufficiently developed, and ore could be continuously supplied. run was made, however, and the copper produced was of fine character, and vies in this respect with the best in the land. The copper carries considerable silver, but the exact amount has not been satisfactorily determined. Had the money expended on this smelter been used to develop the prospect into a mine the property would have become in all probability a continuous and profitable producer. No work is being done on this property at present.

A few miles south of the King David mine, and northwest of Simmons' ranch, on Middle Crow Creek, Mr. James Adams is developing the Lenox prospect. The ore body runs a little north of west and south of east, and dips towards the northeast. The shaft is down over forty feet. The ore body has increased from six inches at the surface to thirty inches at the bottom of the shaft, without any breaks in continuity. The ore is a carbonate of lead and galena carrying silver, and towards the bottom a little gold. The ore ranges from ten to sixty per cent. lead; from forty to sixty ounces of silver, and one-third ounce of gold to the ton. Active work is in progress at this time on this property. This lead is remarkable for the occurrence in it of some of the rarer minerals. Among these is wulfenite (molybdate of lead) in beautiful crystals; also aurichalcite, a hydrous carbonate of zinc and copper.

One-fourth of a mile southwest from the Lenox, close to the bank of Middle Crow, W. W. Lewis is prospecting the Julia lode. The ore is mainly free milling gold ore. At the surface the ore was from two and a half to three feet thick, and at the bottom of the shaft, twenty feet deep at this writing, the ore is four feet thick. Assays of this ore give one-half an ounce of gold to the ton.

About one-fourth of a mile northwest from the Julia lode, Mr. Nels Nelson has been working the Agat prospect. A shaft fourteen feet deep and an open cut have been made on this property. The ores assay from one to two ounces per ton. One exceptionally rich specimen yielded $280 in gold and $14 in silver. This is an exceptionally fine prospect.

North of but close by the King David mine, the Eureka lode occurs. It is developed by a ten-foot shaft, and an open cut started for a drift on the lode. Yellow copper pyrites in this lode, mixed with gangue materials, produce by assays $12 in gold per ton. Lead also occurs in this prospect. One specimen gave eight per cent lead and $60 in gold.

The annual assessment work done on the Colorado lode (the old Metcalf) late in autumn, west of the King David mine, produced some unexpected results. The ore previously had been a yellow copper pyrite carrying gold. This season's work brought to light ore carrying in addition galena bearing silver. This has long been known to be a good property, but an unpleasantness between the owners has prevented it from being worked or sold.

Northeast from the Colorado is the Fairview claim, worked by Mr. Dick Holliday. This is a large fissure from eight to fourteen feet wide, but not developed sufficiently to determine the amount of ore it may produce. At the bottom of the twenty foot shaft copper glance is present, and good ore fills almost the entire fissure; also other forms of copper ores, all carrying more or less silver. This fissure can be traced for a long distance on the surface, and the prospect is an exceptionally good one.

Near by is the Stanton Copper King, owned by Prof. F. Stanton. The ore in this lode is a rich copper pyrite. Some iron pyrites also occur occasionally in this lode, and both iron and copper pyrites are of exceptional beauty. I have not personally visited this property, and only judge it by the samples of its ores submitted to me. But from statements that I consider reliable, it appears to have a well-defined fissure, a thick ore body, and is a very promising lead.

A remarkable mineral belt occurs on the east side of this district. It begins north of Simmons' ranch, and extends northward to Table Mountain, over an extent of nearly six miles. It ranges from fifty to one hundred and twenty-five feet in width. The foot wall on its west side is made up of dioryte, felsite, quartzite, gneiss, etc. The hanging wall on the east side is made up of shale and limestone. In this belt are streaks of different kinds of minerals, among which are uranium and manganese ores, and much talc and related minerals. Selenides and carbonates of lead occur at and near the surface. These gradually change at some distance below the surface into galena, in crystals scattered through the gangue. The lead carries more or less silver. This entire belt has been located by different prospectors under the United States mining laws. On one of these claims, the Carbonate Bell, a shaft has been put down forty feet and timbered, and a shaft house erected over it. A great many assays have been made from samples taken from this and adjoining prospects. They run from one to thirty per cent. of lead, and from one-half to twenty ounces of silver to the ton. To ascertain whether any streaks of ore exist here sufficiently rich to work them profitably, a deep shaft should be sunk, and from the bottom a cross-cut made to each wall, and the ore sampled and assayed every few feet. As yet the ores have averaged too low in grade to mine successfully. But the great extent of this belt, and occurring as a contact vein, makes it sufficiently promising to justify its extensive exploitation.

Many other leads exist in this camp which I have been unable to examine. A new impetus has been given to the camp during the last season, and prospecting has been quite active and more claims have been located than in any previous year. A great deal has been accomplished by poor prospectors by the expenditure of comparatively little capital. There can be no doubt that when once capital is risked to sink the best of these prospects to a depth sufficient to make them mines, and the work managed on business principles, the same financial success will attend the enterprise that has characterized mining in the more fortunate camps in the Rockies.

SEMINOLE MINING DISTRICT.

The eastern parties who, during the last year, purchased the long and well-known Deserted Treasure and

Emeletta mines, on Seminoe Mountain, organized the Penn Mining Company. A cross-cut tunnel cuts the Deserted Treasure lode at a depth of over one hundred feet below the surface. The company cleaned out the old workings that had caved, and extended the drifts about two hundred feet. The ore is a free milling gold quartz, carrying some iron and copper pyrites also rich in gold. The ore body averages at least four feet in thickness. The company built a California gold quartz mill of ten stamps, with a concentrator added. A successful run was made in late autumn, and the mill was closed for the winter, but active work is continued on the mine, preparatory to a resumption of milling in early spring.

The Star and Hope gold mines, adjoining the Emeletta, but with a strike at nearly right angles to it on the south, are good gold properties, but not worked at present. Two shafts have been sunken eighty feet deep. Where I examined the breast at the bottom of the shaft near the Hope line, the ore was four and a half feet thick. The dip of the ore body is towards the west or northwest, and changes from fifteen degrees near the surface to fifty-five degrees near the bottom. The ore is free milling, but contains copper and iron pyrites carrying gold. Magnesian minerals occur in the gangue. Applications for patents are pending.

The King mine runs almost parallel with the Deserted Treasure, but more southwesterly and northeasterly. It has been developed by a drift one hundred and twenty-five feet long, and from the far end of it a shaft fifty-four feet deep, the bottom of which, owing to the slope of the ground, is one hundred and twenty feet below the surface. The lode dips towards the northwest. At the bottom of the shaft the ore is five feet thick. It is free milling gold quartz, and carries also much copper and iron pyrite rich in gold. Seventy tons of the ore run through a quartz mill produced $700 in gold, but the pyrites were not saved.

The Jennie, on the same ground, and the Meager and Bennett are also free milling gold prospects of high grade. These properties are not worked at present, but applications are pending for patents.

Recently a shaft has been sunken near the East King

Mine (an extension of the King), and a cross-cut to it encountered a streak of very high grade gold bearing quartz.

Near by these mines other prospects have been worked during the last season. The ground on which these mines and prospects are located is eruptive material and made up of pyroxene, (silicate of magnesia and lime). The black and dark green crystals that occur with it on this mountain are augite. The slates that stand on end in belts through this mountain are highly metamorphic in places. They evidently lay proximately horizontal before the eruption of the pyroxene mass, and were metamorphosed by the heat developed at that time. The fissures now filled with mineral evidently originated during the period of eruption.

Eastward from this point where these mines are located, important and promising prospects have been opened and worked during the last season, but I had no opportunity to examine them.

FERRIS MOUNTAIN DISTRICT.

In this district considerable work was done during the last year. The carbonates and sulphides of lead are silver bearing. Those engaged in mining here are hopeful that with greater depth their prospects will develop into profitable mines. Considerable galena has been shipped from this camp.

SWEETWATER DISTRICT.

In the old mining districts towards the head of the Sweetwater, including South Pass City, Atlantic City, Rock Creek, the Strawberry and Miner's Delight, active work is again in progress, with gratifying promise of success.

The Christina Lake Company, conducted by French interests, and managed by Colonel Emile Granier, has inaugurated work on a large scale. Its purpose is to work the rich placer grounds known to exist in this section. The company intends to conduct the water from the lakes at the head of the Little Popiagie to Rock Creek. The ditch on Rock Creek, nearly seven miles long, is nearly completed. Sixty-five hundred feet have been taken out on the Christina Lake ditch. This ditch when completed will be five miles in length and run 8,000 miners' inches of water. Fortions of it will be heavily timbered, one flume having a projected length of five hundred and a height of seventy feet. The company expects to work all the placer ground from Rock Creek to the Strawberry. It has located a great deal of ground, and reports itself well pleased with the results of the prospecting which it has done during the season. One of the results of the work was the finding of gold nuggets of unusual size along Rock Creek. The company has expended in this preparatory work over $100,000. This enterprise is a very important one to the mining interests of the Territory, and if continued cannot fail to be richly rumenerative to its projectors. Heretofore the prime obstacle to placer mining has been the scarcity of water. This difficulty this company is overcoming by their long ditches and canals. It is not, however, engaged in quartz mining.

The placer grounds on Spring Gulch, at Miner's Delight are still successfully worked every spring while the water lasts. Up to date these grounds have yielded over $400,000 in gold.

Formerly much gold was taken from the Carissa mine, at South Pass City, but for some time the property was not worked. Recently one of the original owners, Bolivar Roberts, associated himself with Mr. Van Praag, of Salt Lake, and resumed work on this property. The new shaft is down fifty feet, and as the ore is rich near the surface and the crevice is a genuine fissure, there can be no doubt of the final financial success of the enterprise, provided the work is continued on business principles. The Carrie Shields mine near by is also being worked. The shaft has reached a depth of one hundred and fifty feet. The ore is run through a five stamp quartz mill, and profitable returns are received from it.

At Atlanta City there are also some famous mines. Among these are the Cariboo and Buckeye. The Sauls and Perkins mine has a cross-cut tunnel 500 feet long, but it has not yet intersected the vein. It will cut the lode when completed at a depth of one hundred and sixty feet. One of the richest mines here is the Mary Ellen, but its fissure and ore body is small. It is developed by a shaft eighty feet deep.

The Miner's Delight mine at the head of Spring Gulch—the gulch so rich in placer gold, as observed above—is one of the best properties in this district. When worked in the palmy days of mining here it produced at least $200,000 in gold.

East Miner's Delight mine is owned by Hon. James Kime. The shaft is down one hundred and ten feet. At the surface the quartz lead is twenty feet wide, but at the bottom of the shaft it is only two feet, but the ore is of high grade. A twenty-stamp mill is connected with this property. Neither of the quartz mills at this place are running at this time. The one at Lewiston, also owned by Hon. James Kime, is also idle at this time.

Prospecting has been resumed in this district and new discoveries made during the last season. One of these, at the head of Popoiagie Creek, not far from Wilson's mill, is reported to be rich in galena. This section has never been thoroughly prospected. Gold mining, since its inception, has never ceased in this camp, but as already stated for years it was in a state of decadence, and only recently began to revive. It is not difficult to ascertain the cause of this temporary interruption. Mining was exceedingly profitable while work was confined to and near the surface. At greater depth was reached, some of the mines pinched, but increased in grade of ore. A few came into broken rock masses, where the ore body partially or entirely gave out. Water also became troublesome, and the country rock where it had to be cut away was exceedingly hard. Some of the mining companies that had done well previously had also expended their gains, and when these double difficulties were encountered—the pinching of the ore bodies and the influx of large quantities of water—not sufficient capital was left to drain the mines and work through the contracted areas. Some companies that had done well were afraid to risk any capital in going deeper, and some had no money left for further development. Private individuals interested in the district could not afford the expense involved in deep shafting. Indian difficulties and stampedes to supposed more promising gold camps also lent their influence to deplete this camp of miners and capitalists. The combination of all these causes produced that decadence and interruption to the mining industry which has characterized this district. Most of the mining camps in the Rockies have passed through similar stages from similar causes. But they argue nothing as to the intrinsic value and richness of a camp. The geological conditions exist here that promise the richest results. The strata are archæan, and of the same geological age as those in which the richest mining districts of the adjoining States and Territories occur. The ore bodies occur in genuine fissures, and they have already yielded large quantities of gold. The contractions of the veins in this district occur to a greater or less extent in all gold mines elsewhere. There are barren spots in all mines. What is needed, and in my judgment the only thing that is needed, is that greater depth should be attained. Whenever capital is sufficiently enlisted to accomplish this—to work these properties on a large scale—the same rich results will be attained as have characterized the best gold camps in the land.

OWL CREEK DISTRICT.

Southeast from Washakie's Needles, on the Big Horn West Mountains, on the headwaters of Owl Creek, prospecting was done as early as 1867 by miners from Atlantic City and Miner's Delight. They were driven out by Indians. In 1877 about sixty miners from the Black Hills again visited this region. None of these remained, owing to the want of mining facilities and the presence of Indians. In the spring of 1884 Lilbun Wood, Esq., and others went into this district and located placer claims, and have retained their interests up to the present time. Considerable prospecting was done during the summer of 1885. The placers were found to be rich in gold, but the deficiency of water made it impossible to work them on a large scale. Mr. Wood estimates that if water could be gotten on to the rolling table lands above the stream beds and the ground sluiced, from $50 to $100 a day to the man could be made. To accomplish this purpose capital, as elsewhere in extensive placer mining, is needed for the construction of long ditches and flumes. The geological conditions indicate not only rich placer grounds, but further up at the source of those streams a region rich in gold bearing quartz leads. The region is well timbered, and the valleys fertile and fruitful in grasses, and when it is once opened by roads and railroad facilities it will be inferior to none of the mining districts of the Territory.

West and north of the Owl Creek district proper, on the headwaters of South Owl Creek, placer grounds have also been located during the last season and considerable gold taken out.

BRIDGER MINING DISTRICT.

During the year considerable work has been done in this district. The Yankee Jack is one of the promising mines. The direction of the lode is northwest and southeast. It dips towards the southwest at an angle of seventy degrees. The fissure is thirteen feet wide. The ore body is from one to three feet thick, and is rich in silver, much of which is in the form of silver sulphide. Fine specimens of metalic bismuth occur in this lode. The foot wall is largely composed of talcose slate, and the hanging wall is primary slate containing chlorite. Mining is here done by means of the Ingersoll drill, and the shafting is proportionately rapid.

The direction of the Mascotte is also northwest and southeast, and the dip southwest. The vein is one foot wide. The lead carries twenty ounces of silver to the ton of ore. There are also two feet of hard slaty shale carrying oxides of iron and copper.

The Charter Oak has a shaft one hundred feet deep. At the surface it has a vein of ore one foot thick, which increases towards the bottom of the shaft, where it is seven feet in thickness. The ore is an oxide and carbonate of copper. Three feet from the surface it assays twenty-five per cent of copper to the ton.

The Battle Creek is a galena lode. The shaft is down eighty feet, and it runs from twelve to seventy ounces of silver to the ton. It is fifteen feet between walls. Gauges of yellow clay occur on each wall and one in the middle. The country rock is a porphyritic trap.

This is an exceedingly promising district. The developments will soon be such that stoping grounds can soon be opened, when there will be nothing to prevent the taking out of mineral in richly paying quantities.

CUMMINS CITY DISTRICT.

With two exceptions no mining has been done in this district during the last year. These exceptions are the Copper Queen and the Bismuth mine, on Jelm Mountain.

The Copper Queen is owned and worked by Messrs. Thomas and Metcalf. It lies half a mile southwest from Cummins City. Its direction is northwest and southeast and dips southwest. The fissure is twenty-four feet between walls. One shaft has been sunken eighty feet. Drifts have been run at fifty and eighty feet. The ores are sulphides, red and black oxides and glance. At the bottom of the shaft metallic copper also makes its appearance. One streak of ore eighteen inches thick runs sixty-five per cent. in copper, with a little gold and silver. This property is remarkably favorably situated for successful and cheap working. A stream in Bear Gulch which has a fall of fifteen feet to the hundred, turns an overshot wheel and empties the mine of its water by a lift pump whenever needed. Power can also be supplied from this source for any of the operations of the mine requiring it.

The Bismuth mine, at Jelm Mountain, is a remarkable deposit of this mineral. A lump of the ore before me runs seventy-five per cent. of pure bismuth. At the surface it occurs in lumps weighing hundreds of pounds. Mr. McMullan, the owner, is sinking in order to recover the lead, which was lost after development was commenced.

In this district exceptionally rich free milling gold occurred in surface deposits. Owing to the broken and faulted character of the country the rich leads were lost when sinking was commenced, but there can be little doubt that if mining is resumed here and the old prospects properly exploited, permanent bodies of paying gold ore will be encountered.

Much has been learned and great improvements have been made in mining, milling and the reduction of ores during the last decade. This makes it possible to work many of the prospects and mines of the Territory at a profit, that were formerly financial failures. A misapprehension exists in the public mind in regard to the causes of the losses in mining. The general opinion is that the losses come from the poverty or worthlessness of the mines themselves. This sometimes has been the case, but is by no means the principal cause of failure. The cause that has produced the great majority of failures is lack of proper business management. Too often men have undertaken the management of large mining interests who either had been failures in everything else or knew absolutely nothing about the business. In such cases failure has been certain from the beginning. At present there ought not and need not be any great losses in the selection itself of mining property. The business is now so well understood that such property can be selected with safety, or prospected to determine its character at comparatively small cost. When the business of mining is properly entered upon there will be fewer failures than accompany the mercantile and manufacturing industries, or in professional life.

IRON CARBONATES IN WYOMING.

Iron is of more importance to the civilization of the world than gold and silver. Were the supply of iron stopped the wheels of progress would cease to turn. It enters into more important uses than any other metal. It is to the interest of the nations that it be produced cheaply and abundantly, while the men engaged in its manufacture should also be well paid. To accomplish this end a combination of favorable circumstances is required. Among these are an abundance of the best ore easily accessable, and fuels and fluxes also close at hand. These conditions are present at the southwestern base of Seminoe Mountain to a degree found rarely elsewhere on the globe. Only one thing is lacking, namely: Transportation facilities, the nearest point to a railroad being Rawlins or Fort Steele, on the Union Pacific Railway. If the railroad projected down the North Platte should be built, it would run so close to these iron ore bodies that transportation for them could readily be provided.

LOCATION AND KINDS OF IRON ORES.

There are three kinds of iron ores conspicuously developed in Wyoming, namely: Hematite, iron carbonate (siderite), and magnetic iron. Only bodies of the two former will be discussed in this paper.

HEMATITE ORE.

The largest body of this ore in Wyoming (and as will be shown hereafter in the United States), occurs in Township 25, north of ranges 85 and 86 west, at the base of Bradley's Peak, on the Seminoe Mountains, nine miles west of the Platte River, and twenty-six miles a little east of north from Rawlins, on the Union Pacific Railway. The Seminoe Mountains, in which this body of hematite occurs, is an extension eastward of the Ferris range, which range is an extension of the Wind River range. About seven miles (proximately) further west the Seminoe Mountains are separated from the Ferris range by Sand Creek Canyon.

Access can be had to this ore body at present by the main road from Rawlins to the Seminoe gold mines, which passes within a mile and a half of the southern side of this deposit. A road also extends from here to Hurt's ranch eastward near to the Platte River. With little expense a wagon road could be constructed from the main wagon route directly to the ore body. From these hematite deposits the grade is downward to the coal beds in the valley on the way to the Platte.

PHYSICAL STRUCTURE.

On approaching the iron beds from the main road going northward, the southern side is first encountered. Here over an area one mile from south to north and two miles from east to west, hundreds of small knolls occur composed of ore. There is an irregular ascent going northward, and the difference in level between its southern and northern side is, commencing at its first out-cropping, six hundred and seventy feet. The top of the highest part is seven thousand nine hundred feet above the sea level, and the lowest cropping seven thousand two hundred and thirty feet. A beautiful streamlet of water courses down over this ore body, reinforced at several places by large springs of the purest water. These streamlets have cut ravines and canyons through the ore body. The physical conditions indicate that the ore extends into the mountain much deeper than appears at the surface. The masses of ore that crop out over all the knolls are of all sizes, from a few pounds to thousands of tons.

KIND AND QUALITY OF ORE.

As already observed the ore is hematite, but of several varieties. Walking over this mountain of ore the observer notices that some of the ore has a metallic lustre; that is specular hematite. Occasionally small patches are observed with a foliated structure; that is micaceous hematite. Large masses, too, are either submetallic or unmetallic in appearance, and of a brownish red color; that is red hematite. I observed very little ore here that was soft and earthy, and what little occurs comes apparently from the pulverization of the red hematite; this kind is red ochre. On the borders of the deposit a hard unpure siliceous clayey ore occurs with a brownish red jaspery look; this is known as jaspery clay iron. Clay iron stone, which is the same as the last, but with the color and appearance less like jasper, occurs in a few places on the border. These two varieties shade into each other. They often assume the appearance of petrified wood structure. Small quantities of lenticular argillaceous ore, which has small flattened grains also occurs on the western side. More rarely than either of these is the occurrence of itabyrite, a schistose hematite in hight metallic laminæ or scales. But the great mass of the ore here is specular hematite with an iron gray color, and with a hight metallic lustre, some of it verging to browish red and jaspery colors. I know of no one who has made an analysis of the specular hematite except myself, and therefore give them in lieu of anything better. It will be an indication of the general purity of these ores. The only substance present in this ore body that has yet been detected that detracts from its value are occasional streaks of quartz that to a small extent in places are intercollated among the layers or masses of ore. In mining this material would of necessity have to be thrown aside.

ANALYSES OF HEMATITE ORES FROM THE BASE OF BRADLEY'S PEAK, SEMINOE MOUNTAINS, WYOMING TERRITORY.

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Iron	59.33	62.13	61.47	68.09	67.66	60.88
Oxygen	25.42	26.62	26.34	29.18	28.99	26.09
Silica	12.17	6.11	5.18	1.19	.72	1.11
Lime	2.21	1.01	2.33	.51	1.23	5.79
Magnesia	.50	1.23	2.03	.02	.68	3.25
Alumina	.01	2.18	2.20	.54	.21	1.74
Titanic Acid	Trace			.03	.04	.43
Loss in Analysis	.36	.72	.45	.44	.47	.71
	100 00	100 00	100 00	100 00	100 00	100 00

Pure hematite (iron sesquioxide) contains seventy per cent. of iron. (See Dana's Manual of Minerology, page 177). The hematite of this locality approximates the richness of the purest article, as is seen from the above analyses, where the average of six samples reaches sixty-three and twenty-six one-hundredths per cent. of the ore. It should also be noted that the deleterious matters that are contained are comparatively small in amount. Some of the samples containing not even a trace of titanic acid and no phosphorus at all. The great body of the ores at this locality will probably average equally high in richness and quality.

QUANTITY OF ORE.

Considering that this ore body extends for an unknown distance into the mountain, it is safe to estimate it from the shape of a pyramid two miles long and one mile broad, and six hundred feet high, especially as the mountain does not slope on an average as much and equally from a gradually formed point. The opex is more of a line than a point, and therefore the number of cubic feet would be more than in such a structure as a pyramid. But estimating on the principal of a pyramid six hundred feet high, five thousand two hundred and eighty feet wide and ten thousand five hundred and sixty feet long, and we have eleven billion one hundred and fifty-one million three hundred and sixty thousand cubic feet, or one billion five hundred and sixty-three million nine hundred and seventy-eight thousand tons. In this calculation the specific gravity of the hematite is taken at four and five-tenths, though it varies from those figures to five and three-tenths. Were the estimates based on the latter figures, the number of tons would still be greater in this pyramid of ore. The weight of a cubic foot of ore is, of course, obtained by the weight of a cubic foot of water (sixty-two and three hundred and fifty-five one-thousandths pounds), multiplied by the specific gravity (four and five-tenths) of the ore. All these figures show that the ores here are practicably inexhaustable. The extent, however, and value of the Seminoe iron ores can best be seen by

A COMPARISON WITH THE MOST NOTED DEPOSITS OF HEMATITE ELSEWHERE.

The largest shipments now taking place anywhere in the United States are from the Lake Superior mines, near Marquette. Some years the output has been as high as two hundred and sixty-five thousand two hundred and thirty-five tons, but the average is much below that, and probably near two hundred and fifty thousand tons. But at that rate the Seminoe mines would not be exhausted in six thousand two hundred years. In regard to bulk the Superior mines have more extent but the ore is inter-stratified with more foreign materials. There the hematite is of the schistose variety, the average breadth of the district is about six miles, and extends westward from the lake shore about twenty miles. The strata which are much contorted are chiefly talcose and chlorite schists, passing upwards into parallel laminæ of red jasper and hematite, whose united thickness is about one thousand feet and upwards. A large portion is too highly siliceous to pay for working. The beds that are quarried at the Jackson and Superior mines are about one hundred and fifty feet thick. While, therefore, the iron area is here much more extended than at the Seminoe Mountain, it is so much inter-stratified by common rock masses as to make the amount of hematite practically much less. (Phillips' Metallurgy of Iron, page 132). Next to the Superior mines the iron mountains of Missouri are the most celebrated hematite bodies in the Republic. The iron mountain proper is a flattened dome-shaped elevation about three hundred feet high, and forms the western extremity of a ridge of reddish porphyry, which rises considerably above the ore body and stretches over a mile to the eastward. The surface of the mountain is covered by huge blocks of iron ore, which become massed towards the top. Pilot Knob is much higher than Iron Mountain, the height from the base being six hundred and fifty feet, but it is composed of a distinctly leaded siliceous rock, and for two-thirds of its distance to the top quartz predominates, and only the upper portion of the mountain consists of hematite beds, but these alternate even here with siliceous rocks. The richest ores exhibit a distinctly siliceous structure, thus differing from those of the Iron Mountain, which are compact and without clearage.—(Phillips' Metallurgy of Iron, page 135). Thus it will be seen that Pilot Knob approximates in mass to the iron mountain in the Seminoe range under discussion, but in quantity of genuine ore does not compare with it. In fact, there is less ore in both these mountains—Iron Mountain and Pilot Knob—than there is in the hematite deposit on the Seminoe Mountain.

The nearest approach, perhaps, to a hematite deposit like the one at the Seminoe is the one at Glademes, in Spain, which is worked by an English company. Here a mountain of iron three thousand six hundred feet long and five hundred and ten feet high rises above a river that flows at its base. At that elevation it becomes capped by limestone. Beneath the limestone the whole face of the mountain is composed of iron stone and rocks of solid ore, without any foreign admixture, which stand up vertically one hundred and fifty feet. The ore in sight is estimated to amount to from sixty millions to seventy millions of tons, but it is believed that between three and four times that amount can be made available. That ore is in high repute, and for the purpose of comparison with the Seminoe Mountain ore, the the following analyses are given, taken from Phillips' Metallurgy of Iron:

	No. 1	No. 2	No. 3
Silica	5.55	1.70	7.65
Iron Sesquioxide	78.80	79.20	76.
Alumina	3.50	6.80	5.80
Manganese	0.651	2.88	0.83
Sulphuric Acid	0.068	0.62	0.34
Lime and Magnesia	Trace	Trace.	Trace.
Water Combined	11.653	9.672	10.128
	100.222	100.872	100.748
Lost in Drying	.066	1.8	1.6
Metallic Iron	55.16	55.44	54.20

It will be observed that these ores are remarkably uniform; have no deleterious ingredients, but have less metallic iron than the hematites of the Seminoe Mountain, and in many respects resemble them closely, the most remarkable difference being the almost entire absence in the former of lime and magnesia.

In Styria the erzberg, or ore mountain, rises two thousand five hundred feet, and this is capped by siderite. But the good ore is only in the lower beds, where copper pyrites, quartz carbonate of calcium, and more rarely cinnabar is associated with the iron ores. The yield here is one hundred and ten thousand tons annually, and fifty million tons are stated by Phillips to be laid open by the workings. Were it not for the foreign matter here associated with the iron ores, the deposit would surpass in bulk that of the Seminoe Mountain, but their presence makes the former inferior to the latter.

These are among the principal colossal hematite ore deposits in Europe and America. None of them really equal that in bulk on the Seminoe Mountain. Most of them are worked on a very large scale, the ease and cheapness with which they can be worked making it possible for their controllers to compete successfully at all times with producers from less favored mines. In England there are many fine hematite ore bodies, but none are reported of such colossal dimensions as those discussed in this paragraph. The hematite that occurs in Cumberland is among the finest found anywhere, and as it is singularly well adapted, without mixture with other ores, for the manufacture of Bessemer steel, and for purposes of comparison the following analyses, made by A. Dick, are here given.

ANALYSES OF CUMBERLAND (ENGLAND) ORES.

	No. 1	No. 2	No. 3
Sesquioxide of Iron	95.16	90.36	86.50
Manganese	0.24	0.10	0.21
Alumina		0.37	
Lime	.07	0.71	2.77
Magnesia		.06	1.46
Carbonic Dioxide			2.96
Phosphoric Oxide	Trace.	Trace.	Trace.
Sulphuric Acid	Trace.	Trace.	0.11
Iron Bisulphide		0.06	
Insoluble Residue	5.68	8.54	6.55
	101.15	102.20	100.56
Metallic Iron	66.60	63.25	60.55

The average amount of metallic iron in these three analyses—sixty-three and forty-six one-hundredths per cent.—is but slightly above the average of the Seminoe ores, namely: Sixty-three and twenty-two one-hundredths. The principal difference between them being the presence of more silica—over two per cent. more—in the Cumberland hematite than in the Seminoe, and less lime, magnesia and albumina in the former than in the latter. The former, too, has a small quantity of manganese—one hundred and eighty-three one-thousandth—while in the assays given the latter has none. On the eastern edge of the Seminoe ore body in one streak of ore a little manganese, seventeen one-hundredths per cent., was encountered, but no table of that assay has been given, because it was not carried out entirely. This subject will be more fully discussed under the section on Bessemer steel.

I.—SPATHIC IRON—IRON CARBONATE.

These ores are referred to here because they are present in large quantities on some petroleum properties of Wyoming. The term large is here used because the spathic iron ores no where occur in such prodigious bodies as characterize the hematites in a few localities. Almost the only exception to this statement being the large, irregular mass of spathic in Permian rocks, in Thuringia, which have been worked for seven hundred years, the depth of the deposit being three hundred feet, and one mile long. In England, where an immense amount of spathic iron ore is used, some beds are mined where the ore is only six inches thick, as at the Clay Wood mine. At Park Gate the Old Black mine produces one thousand five hundred tons per acre, though the ore body is only eleven inches thick. Compared with these beds, famous in English metallurgy, the spathic ore deposits that occur in Wyoming are large.

SPATHIC IRON ON THE BIG HORN OIL BASIN.

This basin lies north of the Rattlesnake Mountains, and in Townships 34 and 33, north of ranges 87, 88 and 89, west. It is forty-five miles north and from six to twelve miles west of the Seminoe iron beds. The iron occurs here in thin sheets from three to ten inches thick, some of the sheets being in nodules and others in fractional beds, the whole being inter-stratified with beds of the Fort Benton cretaceous shales, and dipping towards the northeast at angles varying from twenty degrees to thirty degrees. This iron ore, though spathic in nature, closely resembles the English black band ores. The nodules contain a large amount of alumina (clay). Owing to the thinness of the beds, the ores would be of no importance were it not that they contain manganese, and spiegeleisen for the manufacture of Bessemer steel is, or can be made from it, or by mixing small quantities of it with hematite, as will be shown further on. An analysis of this ore will be given in the next paragraph.

SPATHIC IRON ON THE POWDER RIVER OIL BASIN.

This basin is in Townships 40 and 41, north of range 81 west, and close to and on the east side of the South Powder. Here, in sections eighteen and nineteen, seventeen, twenty and thirty, and in other portions of the basin, spathic iron is found in beds from one to four feet thick. It occurs both in nodul and bedded forms. The color is dark brown, blackish and entirely black. Like that on the Big Horn Basin, it closely resembles black band. The following analyses will show the character of these ores. No. 1 is a specimen of nodular ore from the Big Horn Basin. No. 2 is a nodular, and Nos. 3 and 4 bedded ore from the Powder River Basin.

	No. 1	No. 2	No. 3	No. 4
Iron Protoxide	42.05	41.22	52.31	52.72
Manganese	1.90	2.01	1.48	1.97
Lime	2.20	1.82	1.20	.80
Magnesia	.88	1.01	.75	.50
Silica	5.60	3.17	.97	1.66
Alumina	3.24	4.12	3.60	4.07
Carbonic Dioxide	40.995	38.02	34.04	33.98
Phosphoric Oxide	Trace.	Trace.	.01	Trace.
Moisture Combined	.75	1.10	.65	.86
Carbonaceous Matter	2.015	6.61	4.21	2.65
Loss in Analysis	.37	.92	.81	.79
	100.00	100.00	100.00	100.00
Metallic Iron	32.70	32.057	40.412	41.001

These analyses show that these ores would alone, or in combination with hematite, be admirably adapted to the production of spiegeleisen for the manufacture of Bessemer steel.

The following analyses of the English spathic iron ores, taken from Phillips, will give, by comparison with the preceding, an idea of their similarity:

	No. 1	No. 2	No. 3
Iron Protoxite	49.77	43.84	47.16
Iron Sesquioxide	0.81	0.81	
Manganese	1.93	12.64	10.61
Lime	3.96	0.28	0.50
Magnesia	2.86	3.63	3.23
Carbonic Dioxide	37.20	38.86	38.50
Phosphoric Oxide	Trace.		
Sulphur	0.04		
Water in Combination	0.30	0.18	
Insoluble Residue	3.12	0.08	
	99.96	100.32	100.00
Metallic Iron	38.95	34.67	36.75

The English spathic black band ores vary from the above in containing little or no manganese. The former is extensively worked in Weardale and Durham, and carried to Wales to make into spiegeleisen. As already stated, the spathic iron ore on the Powder can be used for the same purpose, especially after transportation facilities are provided.

II.—FACILITIES FOR THE MANUFACTURE OF IRON AT THE SEMINOE MOUNTAIN.

The requirements for making iron cheaply and profitably are: An abundance of first-class, easily-worked ore, cheapness of fuel, and lime for fluxes near by. The first requirements, as we have seen by the foregoing, is present here as nowhere else. Coal of the lignite variety is within two miles, though where it is opened not of first-class variety. Seven miles east of the iron mountain an opening has been made into coal beds, which are of first-class quality. The bed is from ten and one-half to eleven feet thick, and at the end of a slope made through solid coal over one hundred feet long, the breast shows hight solid coal. About one hundred feet north of this bed there is another of coal from eight and one-half to nine and one-half feet thick that is remarkably firm and solid. Experiments have not yet been sufficiently varied to tell whether there are good coking coals in Wyoming, but there is no good reason why there should not be. But provided these coals here do not coke, they are of such fine quality that if used like the bituminous coals of Pennsylvania and Ohio that do not coke, they can still be employed in the reduction of the hematite ores. There the use of non-coking bituminous coals in the reduction of hematite ores has been long increasing. The coals near the iron mountain, while belonging to the lignite series, are highly bituminous, but neither coke nor swell in burning. They have but a small quantity of ash and water in chemical union with the carbon. I have no doubt, therefore, that they can be successfully used in the reduction of these hematite ores. In regard to lime, which is always needed and employed as a flux to unite with impurities that exist in all ores, there are immense ledges of it north and east from the hematite mountain. Thus it will be seen that all the crude materials for the manufacture of iron exist here close together. If iron reduction works were established at the rivulet close to the coal bed, the same tramway could be used to bring down the ore and limestone, as the grade is downward from the latter to the former. Or the works could be established at the Platte, a little further east, along which river a railroad is projected. The coal beds referred to above extend to the river, and a tram-way could bring to the same point the ore and limestone.

BESSEMER STEEL.

As steel is rapidly taking the place formerly monopolized by iron, the inquiry is legitimate whether the Seminoe hematite is adapted to its manufacture. It is especially important to know whether Bessemer steel can be made from it.

The requirements of ore adapted to the manufacture of Bessemer steel may vary within certain limits. The pig iron, however, from which it is made must be free from sulphur, phosphorus and copper, as the process is incapable of reducing to any great extent the proportions of these bodies. On the other hand, the presence within certain limits of silicon and manganese is considered desirable, and until the whole of the latter is eliminated the oxidation of the iron takes place to only a limited extent. The silica from oxidation of silicon combines with the manganese oxide and forms a liquid slag. The pig iron should contain at least one and a half per cent. of silicon, and not more than two-tenths per cent. of phosphorus. Somewhat differing from this is the pig iron that is used for Bessemer steel in Westphalia. It is made from a mixture of hematite and spathic ore, and contains five per cent. of carbon, two per cent. of silicon, and averages one per cent. of manganese, six one-thousandths per cent. of phosphorus, and four one-thousandths per cent. of sulphur. The former pig iron for Bessemer steel is made from hematite ore at Warwick, Cumberland, England. The analyses of these ores is given on a former page. They contain only one constituent that is absent from the hematite ores of the iron mountain at the Seminoe. That one constitutent is from ten one-hundredths to twenty-four one-hundredths per cent. of manganese. No constituent injurious to the manufacture of Bessemer is present in ores of this mountain. They only lack a small quantity of manganese. That, however, can be supplied in either one of two ways, namely: By adding to each charge a small quantity of the spathic ore brought from the Big Horn or Powder River oil basins; or adding to it ores from the east side of iron mountain, which contains more or less manganese. Or what would be better still, for the manufacture of Bessemer steel, take all the ore from the east side of the iron mountain. A thorough exploration of this mountain of iron would probably reveal other streaks of ore that would contain a sufficiency of manganese for this purpose.

MANUFACTURE OF IRON WITH OIL.

This might be profitable on the Powder River oil basin where petroleum and spathic iron occur close together. It is premature to discuss this method of manufacture at the hematite deposits on Seminoe Mountain, where vast coal beds are convenient. And yet even there for some purposes it might be preferable, because of the intense heat devoid of all injurious ingredients that can be obtained in that way. Thus it will be seen that one of the main causes of the failure of iron works throughout the Republic would not be found here. The causes of failure in many instances have been the establishment of iron works where neither nature nor the Creater designed them to be, namely: Far away from the crude material, and where ore, fuel and flux had all to be brought from a distance, thus greatly increasing the expense of manufacture. In the early history of the iron industry in Pennsylvania, furnaces and forges were sometimes established far away from lines of transportation, but close to fuel or ore, or both, or the opposite, but with some one or more elements of success wanting. Where all the essential elements of success are wanting, iron industries must fail sooner or later, as they ought to fail. Where, on the other hand, fuel, ore and fluxes, and means for transportation are concentrated on a small area, as for example at Johnstown, Pennsylvania, the iron industry is the most prosperous, and endures successfully through the various fluctuations of prices to which this business is exposed. All the possible means for success are present at the Seminoe Mountains except transportation, and that will be provided in the future.

III.—GEOLOGICAL POSITION OF THE IRON DEPOSITS.

The rock masses of which the iron mountain forms part, are clearly metamorphic, but whether they belong to the Huronian (Taconnic of Emmons) or Laurentian is not so clear. This is not a place to enter into a discussion of that point, and therefore I shall continue for a present working theory to regard this deposit as of Huronian age. If Huronian, then it represents the lower portion, as the deposit is capped further north by limestone. Quartzite, inter-stratified with gneissoid, hornblende, micaceous and chloritic rocks and slates, abound around the iron deposits. Epidotic slates are also present, and the limestone contains jaspery layers. From the character, therefore, of the accompanying and enclosing rocks, it is inferred that the deposits are of Huronian age. This places them in the same general period of geological time as the iron mountains of Missouri, the hematite beds of Marquette, Michigan, on Lake Superior, and the great iron beds of Canada. This is a great iron horizon, and it is remarkable that most of the conspicuously great deposits occur on it. Lying against this Seminoe

Mountain are Potsdam standstone, then carboniferous strata, against which lie triassic red sandstones and then jurassic beds. On these latter lie the cretaceous beds, including the Dakota, Colorado and Fox Hills groups, and against the latter the Laramie group, containing the coal alluded to in a former paragraph. All these strata lie against and dip away from the Seminoe Mountain at an angle varying from sixty degrees to seventy-five degrees and eighty degrees. After going eastward and crossing a narrow valley, the strata dip in the opposite direction, namely: Towards the mountain. The uplift, therefore, which produced this mountain, occurred mainly at the close of the Laramie group epoch, and the erosion that has been in progress during the numberless centuries since that time has bored the mountain top down to its present level. Directly south of the Seminoe Mountain, therefore, there is a synclinal valley through which a rivulet flows, and the coal beds on the two sides of this valley dip towards each other, and must be continuous beneath it.

The geological structure of the Big Horn and Powder River spathic iron is given in my report on those oil basins.

SUMMARY OF RESULTS.

1.—In the Seminoe Mountains, at the foot of Bradley's Peak, occurs one of the very largest hematite ore deposits on the globe. This is shown by a comparison of the bulk of this deposit with the largest deposits elsewhere.

2.—In the quality of the ore this deposit is not surpassed anywhere. It contains no injurious ingredients to an injurious extent. It is well adapted to the manufacture of Bessemer steel, requiring only the addition of a small quantity of manganese, and ore containing this can be obtained on the eastern side of the deposits. These facts, too, are ascertained by a comparison of the constituents of this deposit with the best known ores elsewhere.

3. -Within two and seven miles are large beds of coal, one of them from ten and one-half to eleven, and the other from eight to nine feet thick. Though belonging to the lignite series, these coals are bituminous, solid, and free from injurious ingredients. It is believed that they can be used

successfully in the manufacture of the iron that is developed on such a colossal scale near by.

4.—Thick ledges and layers of limestone exist within a mile north and east of this hematite ore body. The necessary fluxes are therefore close at hand.

5.—There is a regular descent from the limestone to the hematite ore body, from the ore body to the coal, and from the latter to the Platte River, which is distant nine miles from this iron mountain. They are nearly in line, and a tram-way could unite them all. The coal beds themselves extend to the Platte, and as a railroad will probably be built along that river, that will be a convenient place at which to place reduction works.

6.—Iron could be manufactured here so cheaply and successfully as to compete with the most favored sections elsewhere, provided proper transportation facilities are provided.

7.—In addition to the hematite beds on the Seminoe Mountain, there are fine bodies of spathic iron ores on the Powder River oil basin and on the Big Horn, but especially the former. They will be valuable for the manufacture of spiegeleisen, so largely used in making Bessemer steel, when once there comes railroad communication with these points. The iron industries, therefore, that can be built up here are of very great promise. It only requires business energy and good management to make them a certain success, and of very great financial value, even in times of comparative depression to the iron industries.

REPORT ON PETROLEUM.

The economic world was for a long time incredulous as to the existence of petroleum in Wyoming in paying quantities. That doubt is now dissipated. No where in the world are the evidences of the existence of large quantities of oil more certain at such an early stage of development.

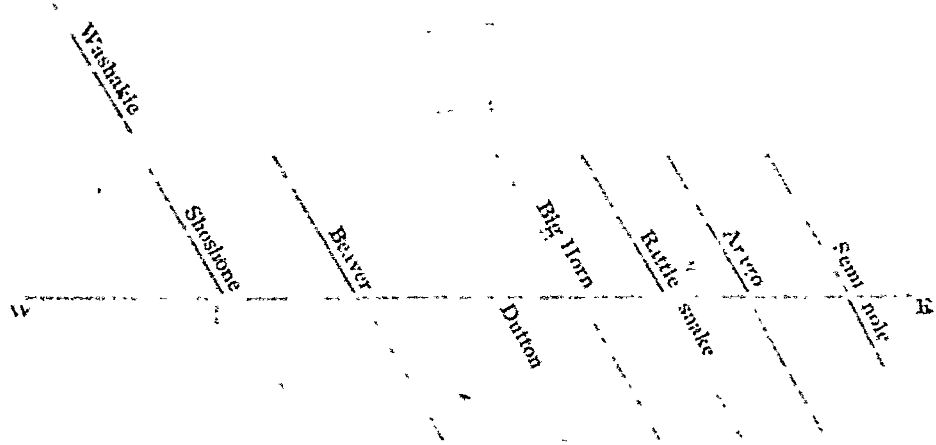
I have, during the last few years, resurveyed a large part of the oil territory of Wyoming, and here submit the conclusions and the data for them which were arrived at. As this report varies slightly from some of my earlier conclusions, it is to be taken as my latest and matured investigations and convictions.

So far as I have been able to ascertain, oil in Wyoming was first observed at Washakie by Homer Haas, Esq., now of Cheyenne, Lieutenant Brown and C. P. Lawhead, all of the Eleventh Ohio Cavalry. It occurred in September, 1864. Mr. Haas had killed an antelope, and seeking water to wash his hands stumbled on the oil springs, on the Little Wind River. Lieutenant Brown rode one hundred and twenty miles to inform Judge Carter, then suttler at Fort Bridger, of the find.

Indications of the existence of petroleum have been found over a much larger territory than was originally suspected. Even the marked proofs of its presence are now found over a comparatively large area—large when compared with that of Pennsylvania, where, according to Carll, (Second Geological Survey of Pennsylvania, Volumes III and IV), the entire productive area covered only thirty-nine square miles. Although the Pennsylvania oil field has since been found to be more extended than at the date of Carll's report, it does not in this respect prospectively compare with that of Wyoming.

OIL DISTRICTS.

The most extensive oil district of Wyoming lies east of the Wind River and north of the Rattlesnake Mountains. So far as is now known it commences at Fort Washakie, from where it extends southeasterly to Township 32, north of range 92 west, of the 6th P. M. Thence directly east to the North Platte River, at the Goose Egg ranch, in Township 32, north of range 81 west. This belt is one hundred and thirty miles in length, and along it occur basins where the oil flows out in springs, and where a great deal of the rock masses are saturated with petroleum. While the conspicuous oil basins occur along this east and west line, their own direction is northwest and southeast, according to the following scheme:



In oil fields in other portions of the world, and notably in that of Pennsylvania, the trend or axis of the basins is in an opposite direction, namely: From northeast to southwest.

Oil indications have been observed along this line as far east as Fort Fetterman, fifty miles beyond the Seminoe, but the Territory has not been well explored beyond the latter point.

Another oil district occurs on the Powder River and its tributaries, but it has not been thoroughly enough explored to give definitely its boundaries. Oil springs, however, are known to exist here in Township 41 north, 81 west, opposite the mouth of Willow Creek; in Township 45 north, 82 west; in Township 40 north, 79 west, on Salt Creek, and at other points along this stream; also at other points on the Powder, Belle Fourche and their tributaries.

Oil saturated rock and oil escapes also occur at and near the site of old Bear City, and at and near Bridger. This last district, on and near the line of the Union Pacific Railway, I have explored too imperfectly to venture a description.

Estimating the middle belt along the north side of the Rattlesnake Mountains at six miles in average breadth and one hundred and thirty miles in length, the amount of oil territory would cover seven hundred and eighty square miles. The oil belts outside this territory will swell the amount to double these figures. This I regard as a low estimate, and far within the facts. How much of this territory will be sufficiently productive to make it of pecuniary value can only be determined by actual development. The prospects of great value may be estimated by a fuller description and discussion of each separate basin.

WASHAKIE OIL BASIN.

This basin, near Fort Washakie, is fifteen miles northwest from the town of Lander, the latter place being by the windings of the road one hundred and twenty miles northwest from Rawlins on the Union Pacific Railway, the two points being connected by a tri-weekly stage from the latter place.

A large spring of oil exists here which is of a thick black color. Though not thick enough to justify it, the petroleum flowing here has been called a tar spring. A specimen submitted to me was of sixteen degrees gravity of the Baume scale. It contains a very small amount of kerosene. The Indians, whom I questioned about it, called it Big Medicine. These oil escapes were also formerly known here, owing to the density of the petroleum, as the asphaltum springs. The oil here has not yet been studied to any extent. The source of the oil is the red trassic sandstone from which it emerges. Owing to the fact of it being on the Shoshone Indian reservation, no title could be obtained to it except from the Indians, which would need to be confirmed by Congress.

SHOSHONE OIL BASIN.

This basin is located twenty-six miles southeast of the Washakie oil springs, and seventy-eight miles immediately north of Point of Rocks on the Union Pacific Railway, and by the windings of the road one hundred and nine miles northwest of Rawlins. The Little Popoagie Creek, a tributary of the Big Popoagie, which, in turn, is a tributary of the Wind River, flows through the basin. The general direction of this stream is first northeasterly and then northerly. The location is mainly on Section 13, Township 32, north of range 92 west.

OIL PHENOMINA.

Oil escapes occur on and near the line that connects this basin with that of Washakie. But the oil of the Shoshone is much less dense than that of Washakie, and while of identical origin they can have no underground connection. At the Shoshone hardened oil occurs, with a constitution very much like that of asphalt, and from eighteen to thirty-six inches in thickness, but overlaid by alluvium from three to five feet thick. It extends continuously over about four acres, and scattered patches extend over a much wider area. Before any improvements were made here a small morass existed made up of oil cake, petroleum, mud and water, and a large number of places where oil escaped. The area over which oil escaped could not have been less than seventy acres. Vast volumes of gas were also continuously escaping. Oil and water were continuously emerging and flowing off through the Little Popoagie. The oil crust, though mixed with sand, is impervious to water and oil. Wherever it is disturbed or penetrated, oil rises in greater or less quantity. The oil cake itself sealed up the oil to a greater or less extent, and thus prevented its flow and loss.

Beneath the hardened oil crust bowlder drift of varying thickness occurs. Next below come fragments of red triassic sandstone, and finally these rocks in place, but slightly fractured.

DEVELOPMENT.

Dr. George B. Graff, who first obtained this basin by purchase, was also the pioneer worker in this field. He dug a straight channel four hundred and twelve feet long, for the old and circuitous creek bed, and built a dam across the stream to turn it into its new route. A second dam at the lower end of the old bed turned it into a lakelet for storing oil. Dr. Graff next sunk a series of shafts from six to twelve feet deep. In the bottom of one of them, known as No. 2, a hole was bored twenty-seven feet deeper. At all my visits this well was flowing and giving out large volumes of gas. At one visit the well was pumped empty for my inspection. After the bottom was cleaned out the large flagstone that was placed over the hole in the middle (which had been done to prevent the hole from being filled up) was removed, the following phenomena were observed:

A thermometer lowered into the hole showed a temperature of fifty-two degrees, Fahrenheit. The flow of oil was intermittant. It boiled out at intervals thus:

Oil, 4¼ minutes: Gas, 1½ minutes.
" 5 " " 3 "
" 2 " " 4¾ "
" 4 " " 2 "

In five days the well was nearly filled with oil, and by measurement it amounted to over fifty barrels, estimating the barrel at forty gallons. The yield thus was ten barrels per day. In 1881 on my second visit there was a slight increase of flow. Two years later, however, owing to a choking up of the bore hole, there was a slight decrease of flow from this well, but no falling off in the other shafts that had been sunk in this basin. Another well east of the preceding was full of oil to within three feet of the top, and was remarkable for the vast volumes of gas that escaped from it with an intonating noise every few minutes. All the wells that were sunk through the oil cake were producing oil at the rate of at least five barrels per day. Some wells not extended through the oil cake were used for storing oil. The flow from all these wells could not have been less than fifty barrels per day. It was stored in the old creek bed already described, and here at some of my visits there were thousands of barrels stored. Periodically, however, the spring freshets overflowed the banks and carried the oil away. Besides the loss occasioned in this way the new creek bed, cut through the hardened oil for four hundred and twelve feet, has permitted the petroleum to escape over that space. The oil, as it comes up through the water and the bubbles burst, produces a beautiful play of colors. All the hues of the rainbow make their appearance.

A curious feature of this basin is that the oil does not rise above a certain level. If a well or reservoir is filled above that point it gradually sinks to the same level as the hardened oil crust. Through this there is no latteral drainage. In all the openings the oil comes up directly from below, and the openings do not communicate, no matter how closely together they may be.

THE ORIGIN OF THE HARDENED OIL

Is not difficult to trace. It must have originated by the lighter portions of the escaping oil evaporating, and leaving behind the more solid parts, which partially oxidised. When one point of escape became super-saturated and hermetically sealed by the hardened residue, a new opening was forced by gas pressure somewhere else until this material reached its present dimensions. Owing to the great number of oil escapes artificially made, there can be little if any growth of this material at present. The rising of the oil to a fixed level has caused this hardened petroleum to occupy a horizontal position beneath the alluvium. So great was the number of oil escapes in this basin at my last visit that it was impossible to estimate them. Owing to the silt, the dust and dirt blown by the wind, combining with hardening oil, the escapes of one week were closed the next. Gas in many spots was also continuously escaping over the whole basin. It bubbled through the oil and water, and even the oil crust. Where no oil or water was present it could be detected by the odor or a lighted taper.

LATEST DEVELOPMENT.

During the fall and winter of 1884 and 1885, Dr. Geo. B. Graff and General W. W. Lowe purchased and shipped boring machinery to the Shoshone basin. Their efforts were crowned with success. At a depth of three hundred and fifty feet they struck a flow of oil that gave eighty barrels every twenty-four hours. This verified the theory that an immense reservoir of oil existed here comparatively near the surface, and upset the doctrine of those who held that no great flows could ever be obtained on the site of oil springs. In fact, as will be shown hereafter, the oil basins of Wyoming cannot be gauged by the principles that condition the presence of petroleum in the eastern oil fields.

PROPERTIES OF THE SHOSHONE OIL.

The oil is extremely black, and the coloring matter is inseparable by any process yet tried, except in the results attained by distillation. By this process the following was obtained:

Naptha	.63
Kerosene, with a fire test of 159°	47.00
Lubricating oil, neutral and light-colored	32.00
Coke	12.00

In its crude state, as it flows from the springs, it has a gravity of twenty degrees in the Baume scale; its flash test is two hundred and ninety-four degrees; fire test three hundred and twenty-two degrees, and cold test sixteen degrees below zero. It will be seen from the above that it could be utilized either for kerosene or lubricating oil, or for both. While not as finely constituted for lubricating oils as some to be noticed hereafter, the amount of kerosene contained in it makes it important and valuable.

By a method of fractional distillation, practiced by Messrs. Wyner and Harland, of England, public analists of London, they obtained the following results:

Kerosene, gravity 807, flashing point 110°, Fahrenheit	17.00
Lubricating oil, gravity 810–824	21.00
Lubricating oil, gravity 840–844	20.00
Lubricating oil, gravity 906	27.00
Coke	14.00
	99.00

They further remark that "the above results prove this to be an exceedingly valuable oil for the production of kerosene and a superior lubricating oil." This oil, in its crude state, was for some time used to lubricate the car wheels of the Union Pacific Railway, and proved eminently satisfactory. Its quality could be immensely improved by distillation, as the analysis of Messrs. Wyner and Harland indicate. The Union Pacific did not discontinue its use from any defect in quality or cost of the oil, but for other reasons. Before employing it the oil was submitted to the

Stevens' Institute of Technology, at Hoboken, New Jersey, by Sidney Dillon, Esq. The result of the test was as follows:

CO-EFFICIENT OF FRICTION.

NAME OF OIL.	PRESSURE 50 LBS.	PRESSURE 200 LBS.	PRESSURE 300 LBS.
Sperm	.0034	.0051	.0057
Shoshone Oil	.0077	.0085	.0071

Assuming sperm to be 100, the following table gives the relative value of the oils as reducers of friction:

VALUE IN PER CENT.

NAME OF OIL.	PRESSURE 50 LBS.	PRESSURE 200 LBS.	PRESSURE 300 LBS.
Sperm Oil	.00	.00	.00
Shoshone Oil	.44	.60	.80
Lard Oil	—	.75	.75

ENDURANCE.

	NUMBER OF REVOLUTIONS.		FEET TRAVELED.	
NAME OF OIL.	1st Trial.	2nd Trial.	1st Trial.	2nd Trial.
Sperm Oil	21.300	24.400	7.434	8.516
Shoshone Oil	11,700	12.000	4.083	4.188

SPERM, TAKEN AT 100, THE FOLLOWING REPRESENTS THE WEARING POWER.

	VALUE PER CENT.		
NAME OF OIL.	1st Trial.	2nd Trial.	Averages
Sperm	.00	.00	.00
Shoshone	.55	.49	.52
Lard	—	—	.52

GUMMING.

NAME OF OIL.	VALUE PER CENT.
Sperm.	10.
Shoshone	6.25
Lard	5.60

This test was made with the Shoshone oil without any preceding manipulation. Such results have rarely been obtained from petroleums elsewhere, except by distillation and the addition of lard oil, an almost universal practice in the preparation of lubricating oils in the east. Another plan has been, and a more legitimate one, the mixing of various kinds and grades of petroleums. This plan is difficult in the east, owing to the great rarity there of natural oils with a gravity of twenty degrees Baume. Gumming, which increases friction and retards motion, is one of the great enemies of lubricating oils. The Shoshone oil is singularly free from this defect. A part of this superiority comes from the entire absence of paraffine. It has been asserted in some quarters that petroleums free from paraffine were unstable. However this may be elsewhere, it is not the case with the Shoshone oil. One bottle of it in its natural state in my guardianship for four years while connected with the University of Nebraska, experienced no change, though left partially uncorked during all that time. Even chemical tests failed to detect any change. No change whatever, except in odor and a slight increase in gravity, was observed in the petroleum left standing in the reservoirs at Shoshone after three years. Like all other petroleums, long exposure permits the escape of the lighter constituents and a consequent increase in gravity. But this change is as slow and even slower than in other petroleums of the highest value.

HOW TO DEVELOP.

This question has already been settled by the success of the initial borings. The large flow of oil secured, its comparative nearness to the surface, and the character of the rock all indicate that wells are the proper agency here for obtaining the oil.

PROBABLE QUANTITY OF OIL.

Theoretical considerations based on the facts gleaned from this basin indicates that the amount of oil stored here and available is very great.

The very large oil flow from the petroleum springs and wells at this point, and the great escapes of gas have already been presented. Now it is well understood among geologists that such an amount of gas, in connection with the escape and continuous production of oil, indicates a very large reservoir of oil in the strata beneath.

The rocks dip away from the Shoshone basin on every side, and those contiguous to it are of triassic and jurassic age. On top of the latter were laid down the groups of the cretaceous and Laramie beds, but these have been removed by erosion, owing to the great elevation to which they were brought by the uplifting process at this point. They are yet found from two to four miles eastward from the basin, and still closer at some points on the northern and southern sides. Such plications as here exist are formed by latteral pressure, as can easily be illustrated by pressure applied to the sides of a book. Such a pressure applied in this way occasionally leaves hollows beneath the anticlinal ridge or ridges, which in the case of rocks through ages fill with water, or, if the conditions be favorable, with oil. Generally in oil districts, the lower portion is water, the middle oil, and the upper the gases generated by the oil, or by the same causes that produce the oil. The break in the strata at the opex of an anticlinal give the initiative for a drainage system, which in the course of ages often wears such fractures, into the creek and bottom forms now here observed. It can easily be seen how water, oil and gas would issue from such a basin, where the rocks have been broken and fissured above. Here the rocks are highly siliceous, porous, soft and massive, and over these limestone and siliceous limestones of jurassic age, with immense beds of gypsum inter-collated among them. The sandstones are brick red, or light red and brown on their faces and joints, but internally often gray or almost white. Much of this color is due to carbonate of iron, which gives the brick red and similar hues when it becomes oxidized. This character of rock is typical of the kinds which it is known constitute the best matrix for holding petroleum. Nearly the entire mass of the triassic, here nearly 2,000 feet thick, is made up of these sandstones, the overlying gypsum and limestone beds belonging to the jurassic. On the flanks of these further back occur the various groups of the cretaceous, the basal member being the Dakota group, made up mainly of dark brown sandstone, much of it comparatively soft. The Colorado group (Fort Benton and Niobrara of Meek and Hayden), made up principally of slates and shales, follows next in order. The Fox Hills group, made up principally of light colored soft sandstone, overlies the whole where it has not been removed by erosion. Still further back over the last, the Laramie, or transition group between the cretaceous and tertiary, the great coal group of the Rockies, has an extensive development.

BEAVER OIL BASIN.

Thirty miles east of the Shoshone oil basin, and fifteen miles east of the Beaver, a tributary of the Wind River, an area of oil lands occurs which is known as the Beaver oil basin. In many respects this basin differs from the Shoshone. This is true in regard to the oil, the physical apperance of the region, the character of the springs, and the geological age of the rocks from which the oil emerges.

PHYSICAL APPEARANCE.

The form of this basin where the oil springs occur approximates to an irregular circle, within which and around its rim, the oil makes its appearance. True anticlinal folds have produced this peculiar structure, modified greatly by decomposition of the rocks and erosion. On the southeastern side the rim has been cut down, and through this outlet a streamlet that rises within the cone flows during the spring months. The rim of this circle is an irregular ridge, which rises in places nearly one thousand feet above the bottom of the cone.

OIL PHENOMENA.

Near the center of the basin, a well sunk six feet square and twelve feet deep, through a peculiar light-colored magnesian shale, (which well was full of water during every visit paid to this basin), is remarkable for the amount of gas constantly escaping from it. It has the appearance, caused by the escaping gas, of a gigantic boiling cauldron. Every inch of surface was in commotion from the escaping gas. Wherever water was standing at the time around and in the basin, more or less gas was bubbling through it. Here in 1880, before any wells were sunken, a lighted newspaper put to one of these jets of escaping gas produced a brilliant illumination.

The water in the well here is strongly alkaline. Oil formerly floated on the surface of the water. Oil constantly rises through the water, but part of it unites with the alkaline waters to form a kind of emulsion. Outside of the magnesian shale where this well was sunk, this phenomena was not observed. One hundred feet northwest of this well, another well was sunken (now caved in) four feet deep that contained two inches of oil on top of the water. One-fourth of a mile north and across the enfolding hogback ridge, where a canyon runs east and west, with a depression in the rim corresponding thereto, an immense quantity of oil crust exists from ten to twenty inches thick. This extends over a slope one hundred and fifty feet long and from fifteen to thirty feet wide. A shaft six feet square and ten feet deep had been sunk here which, before it caved in, was full of water, with two inches of oil on top. Northwest from the well in the cone, and over the rim of the basin, is another oil escape surrounded with some hardened oil. It emerges in a spring of water, and flows off of it. There are still other small oil escapes in and around this oil basin, and many small areas of oil cake.

In the fall of 1883, on sinking the well in the basin, aided by Mr. Haftile, a few feet deeper the escape of gas was largely increased, but very singularly the escape of oil in and around the basin decreased. This proves that the oil is forced out by gas pressure, since when an outlet is increased for the latter the pressure on the oil is decreased and is no longer forced out. At least, since the large openings have been made for the escape of gas, not one-tenth of the oil emerges that formerly spontaneously flowed at this place.

A characteristic phenomena of the rock masses constituting this basin is that they are all more or less charged with oil. The saturation is so complete that I have not been able, during any of my visits there, to find rock that did not emit the characteristic odor of oil. The extreme width of the basin is five-eighths and the length one and one-fourth of a mile. Gas is everywhere escaping. All the water is tainted by oil. During one visit in late autumn, not being able to get water free from oil, some of our party melted "the beautiful snow," thinking by that method to escape the omnipresent petroleum. Even that was a failure. The coffee made from the melted snow was also contaminated with oil. In fact, gas and oil were penetrating and tainting everything. And this corruption of the water will be the chief difficulty in developing this basin.

The oil phenomena that are here brought to light in this basin can be traced four miles southeasterly along the ridge that runs in that direction, until it runs beneath the overlying tertiary rocks, and even there at one point it oozes to the surface.

GEOLOGICAL CONDITIONS.

As already stated, the uplift forming the Beaver basin forms an irregular circle. The dip of the rocks from at least three sides is away from the center. The fourth, or southern side, is made up of several almost vertical ridges or uplifts, dipping, however, apparently southerly. The wearing down of their crests by erosion, and the covering of their sides by superficial materials has very much obscured their structure. On the eastern side the strata are almost vertical, dipping only slightly towards the east: on the north and west the dip approximates more or less closely to forty-five degrees. The highest point is Mount Rogers, five thousand six hundred feet above the sea.

The rocks that form this basin belong to the upper cretaceous or Fox Hills group. This group is here from five hundred and fifty to six hundred feet thick. As the Shoshone oil emerges from the triassic rocks, at least half way down the series, the Beaver oil escapes occur immensely higher up geologically. The whole of the Colorado group, Dakota group, the jurassic and at least the upper half of the triassic—more than two thousand feet of strata—are lying on top of the rocks from which the oil of this basin comes. For the evidence is strong, as will be shown hereafter, that the seat of all these Wyoming oils is the triassic, which is the one group underlying the entire territory where oil basins occur. The Fox Hills sandstone are comparatively soft light-colored, inter-collated with occasional shales. Outside of this basin, and only a few miles north, are the strata of the Laramie group, containing immense beds of coal. One bed fourteen feet thick is remarkable for its high quality. The coal is filled with minute specks of rosin that partake partially of the chemical constitution of amber. Sometimes lumps of it appear as large as hazelnuts.

THE AMOUNT OF OIL

In this basin is probably as great as at the Shoshone. If my theory is correct that the source of the oil is two thousand feet below in the triassic, the amount there must be great to be forced up through such a thickness of deposits. No oil escape could occur from so great a depth were it not that the strata here have been folded, broken and somewhat faulted. The gas pressure, which is here very great as we have seen, is, however, sufficient to bring the oil from such depths where fissures in the strata have occurred. The immense quantities of the gas, the escape of oil and the vast extent of rock surface around and southeastward from the basin that is saturated with petroleum, all alike testify that there must be here, or close by, an immense quantity of oil stored.

QUALITY OF THE BEAVER OIL.

The Beaver petroleum is the best lubricating oil yet discovered in America. This statement will appear to those unacquainted with the facts as an exaggeration, but it is here made because the facts compel it. This oil has endured successfully the test of every experiment.

Mr. Taylor, chemist of the Standard Oil Company, pronounced its gravity to be fourteen and one-half Baume (nine hundred and sixty-eight gravity). My own determination made on the ground was thirteen and ninety one-hundredths Baume. The color resembles dark mahogony, and the odor appears to my senses, when the oil is first taken out, a cross between that of linseed and balsam.

Oil experts universally say that it has all the necessary characteristics of a superior lubricant. Even without manipulation it acts better than the majority of cylinder oils. If, however, it is filtered once and then has ten per cent. of tallow added, it becomes the best of oils for this purpose. Even without the addition of tallow, it is superior to anything in the market. Cheap and easy methods of manipulation can readily be devised and employed to change it into such forms as might be the most useful. For common use on engines, etc., it would be more acceptible, owing to its high specific gravity (fourteen and one-half Baume), if mixed with one-third of Seminole oil, whose gravity is thirty-two Baume. (This latter oil will be discussed presently.) By this and other simple methods the best of lubricators could be obtained for any kind of simple or complicated machinery in use.

Concerning the quality of the Beaver oil, H. K. Taylor, Esq., chemist of the Standard Oil Company, Cleveland, Ohio, thus speaks:

"In answer to your inquiries, I will say that the Beaver oil, brought to twenty-eight gravity, Baume, with the Seminole oil would make a splendid axle oil, but unless the Beaver develops in very large quantity I would not advise you to use it as a basis for axle oil, but to use the Rattlesnake oil instead. The Beaver is the best natural oil for cylinder stock that I ever saw. It has a margin of ten or twelve degrees of gravity over the best cylinder stock made in the east. By filtration the gravity becomes lighter, but I am of the opinion that the lightest colored filtered Beaver would be heavier than the heaviest unfiltered eastern oil."

Everyone who knows the high character of Mr. Taylor will accept the above statement as conclusive.

The determination of Mr. Taylor has been fully confirmed by Messrs. Wyner and Harland, public analists of London, England, whose analysis I append:

"Specific Gravity 966.

Volatile below 650° F.	Lubricating Oil, specific gravity 842–847, flashing at 110° F.	19.00
Volatile above 650° F. to a red heat.	Lubricating Oil, specific gravity 926–935, flashing at 314° F	45.00
	Lubricating Oil, specific gravity 957, flashing at 324° F	12.50
Coke		14.50
Ash		Trace
Loss by volatilization and decomposition.		9.00
		100.00

These oils were mixed and tested for lubricating power. The mixture showed: Specific gravity, nine hundred and nineteen; flashing point, one hundred and fifteen degrees Fahrenheit. Submitted to a cold test considerably below zero (centigrade) showed no signs of solidification. When properly treated by distillation, the products obtained would form lubricating oils equal, if not superior, to the best vegetable or animal lubricants."

Other testimonials could be presented testifying to the high character of these oils for lubricating purposes, but the preceding is deemed amply sufficient.

DEVELOPMENT.

Reference has already been made to the development work that has been done at this basin. It is doubtful whether shafting can ever reach the source of the oil. It cannot unless at enormous expense, if the seat of the oil is in the underlying triassic rocks. Boring is the only proper method for prospecting this oil, and in engaging in this work provision should be at once made for going down at least two thousand feet. The boring, too, should be done at one side of the gas escapes and gas well, as it is well known that large volumes of gas usually lie on top of subterranean bodies of oil. Borings made immediately over oil often result in nothing but gas wells. But if the borings are made to one side, the effect of the gas is to force the oil cut. At this writing the Omaha Oil and Transportation Company are engaged in boring at this place, but I am not advised as to the depth that has been reached. Owing to the extent of the basin, there is room towards the southeast and in other directions for a large number of prospect wells. While water has to be brought from a distance to supply the wants of men engaged at work, the adjoining coal beds supply an inexhaustible amount of fuel.

DUTTON OIL BASIN.

This basin is located westward from the west end of Rattlesnake Mountain, and about twenty miles west by south of French's upper cabin at the head of Deer Creek. It is about ten miles southwest from Deer Creek, where it curves around and flows towards the northwest, and about thirty miles south of east from the Beaver oil territory. The location is in townships 89 and 90 west, and of Townships 31, 32 and 33 north.

The rocks here are mainly made up of the dark shales of the Fort Benton group. Petroleum escapes from these shales in considerable quantities and in many places, and the evaporation of its lighter portions and oxidation in part of the heavier portions, has left here that asphaltum-like substance, which is called for lack of a better name, hardened oil.

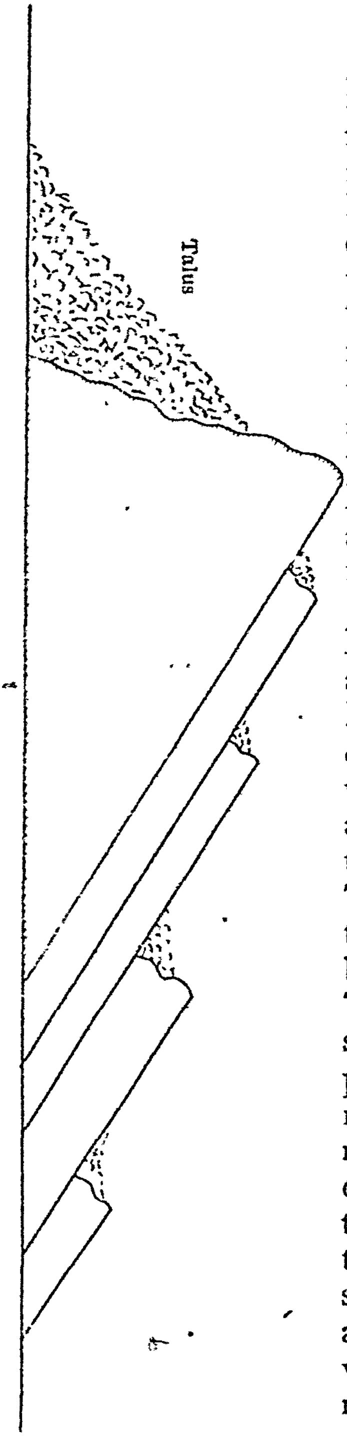
I have not studied this basin and the oil produced here with sufficient detail to give a further description.

BIG HORN OIL BASIN.

This name was given to an area of oil lands on the headwaters of the Powder River for convenience of description, and because it was deemed important to separate them from the adjoining Rattlesnake territory on the east, from whose product the oil greatly differed. It embraces portions of Townships 33 and 34 north, and of Ranges 87, 88, 89 and 90 west. This oil territory runs parallel with the Rattlesnake Mountain range.

PHYSICAL CONDITION AND GEOLOGY.

Parallel lines of low ridges, of the hog-back type, extend along through this territory. A hog-back, in geological language, means rocks that have been uplifted and weathered into some such forms as the following:



These hog-backs traverse this region at first in lines parellel with the mountain. Further away towards the north and northeast, where the Laramie group makes its appearance, the hog-backs gradually assume a semicircular form, as if the ends were extended to circle around the mountain. The streams that rise on or at the northerly base of the mountain cut through these hog-backs, proximately at right angles, and constitute the headwaters of the Powder River. The hog-backs dip towards the northeast at angles varying from twenty to thirty-five degrees.

The neucleus of the Rattlesnake Mountain is composed at this point of archæan rocks of the granite type. Lying against these on the northeasterly side are first silurian rocks made up of Potsdam and Quebec limestones and marbles. Lying against these latter are rocks of Mesozoic age, namely: Triassic, jurassic and cretaceous, the terranes of each period having been broken and weathered into hog-backs. The triassic beds are uniformly of some shades of gray and red, the latter color predominating. The jurassic beds are mainly composed here of greenish gray marls and gray limestones, the latter often being shaly. Above the latter is the basal member of the cretaceous, the Dakota group conglomerates and sandstones. This group is oil bearing a few miles further east, and in the western portion of this basin. Conformably to the Dakota group sandstones is a vast development of the Fort Benton gray and black shales and slates. The entire thickness approximates eight hundred feet. As these shales contain an immense amount of organic matter, such geologists as follow Newberry hold that the oil occurring in Wyoming is distilled from them. Against these shales lie beds of impure siliceous limestone, which represent the Niobrara group, and forming with the last the Colorado group of King and Powell. In many places where this group comes to the surface in this basin, the upper section is more or less saturated with oil. Next above, and conformable to the last, are the sandstone beds of the Fox Hills group, which is the upper portion or division of the cretaceous. One bed of this group is saturated along its whole length on this basin with oil. Beyond the last Fox Hills hog-backs, at a distance of two to four miles, are ridges of the Laramie group, the great coal-bearing group of the Rocky Mountains. This also is believed to be, by many geologists, a transition group between the cretaceous and tertiary ages. The geological relations of these various hog-backs have been determined by their stratiography and their fossils.

OIL PHENOMENA.

As already indicated, the most northeasterly hog-back ridge on this basin is of sandrock, which varies from compact to to loose and friable material. Much of it is so saturated with oil that it yields on distillation from fifteen to twenty per cent. of petroleum. South of the main oil ridge is another, which is only occasionally visible, owing to it having been eroded or worn away down to the level of, and generally covered by the superficial deposits. While not saturated with oil to the same degrees as the former where it is exposed, its exact relation to the oil has not been ascertained, owing to the fact that so much of its length is covered up. Between these two ridges in summer time quantities of carbureted hydrogen escape. The gas emerges in bubbles through the water that flows from springs. As deposits of oil invariably give off gas, both when diffused through rocks and when it occurs in underground reservoirs, it is a legitimate induction to conclude that the escaping gas indicates the presence, at some depth below the surface, of petroleum. Oil in minute quantities flows at least in a few places, one notable point being on the southwest one-fourth of section 34, township 34, north of range 88 west. The oil emerges along a water course between parallel ridges. Though the flow is small, yet as it comes through a considerable thickness of superficial deposits, and a large quantity of gas was escaping betimes during the summer of 1884 when small excavations were made, it is inferred that a large quantity of oil exists here at some distance below the surface. More or less hardened oil and a few other oil escapes occur a little farther west.

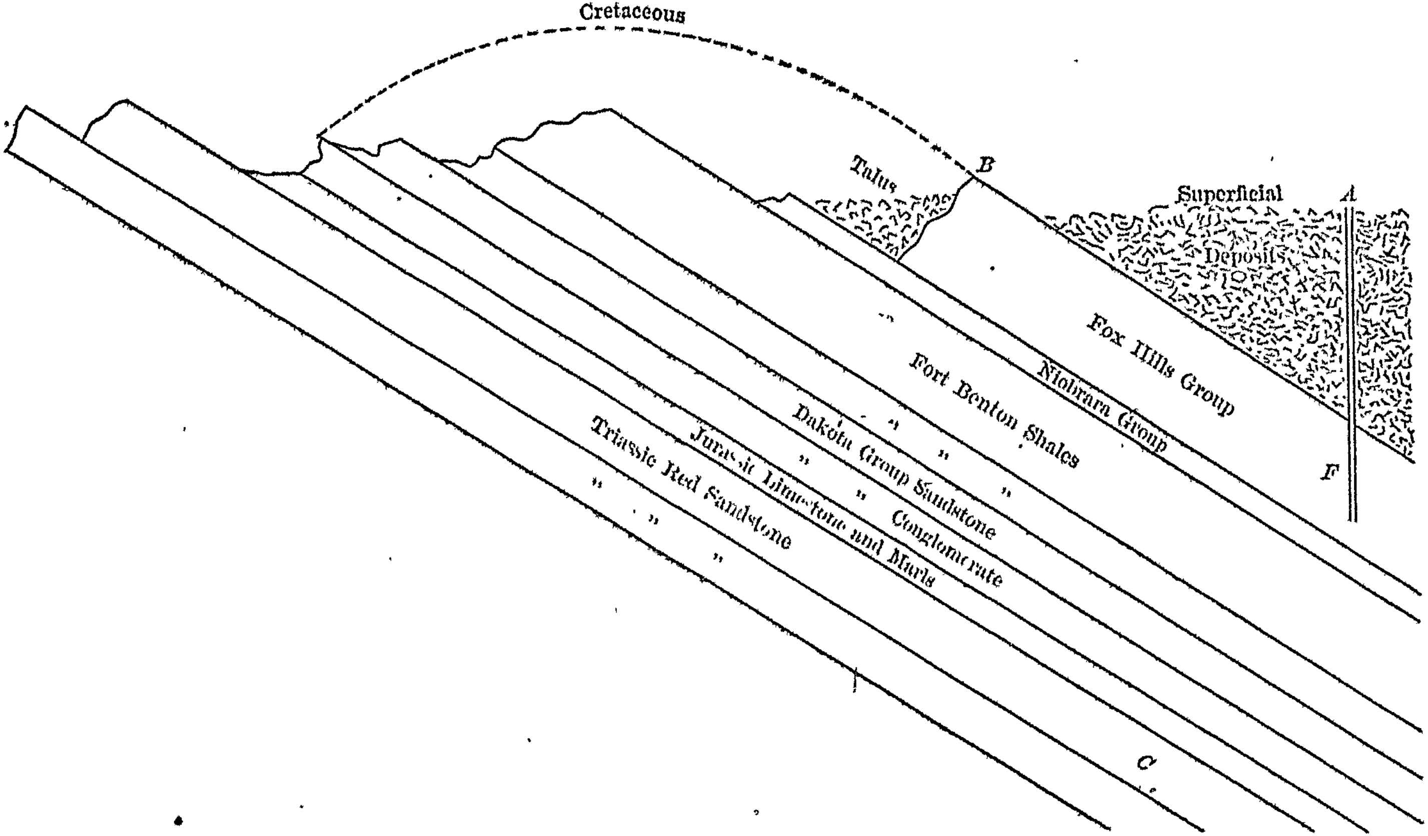
On the northeast corner of section 34, township 34, north of range 89 west, the Fox Hills oil ridge curves around almost in a circle, forming a triclinal, from which the rocks dip in all directions. This is one of the positions in which strata occur, according to LeConte and other geologists, where oil is most apt to occur in large quantities. This is a little west and north of the point at which the Rattlesnake Mountain ceases. A little south of this point the oil ridge again appears, but now runs north and south, and is quite low, and in many places is covered up. Parallel to this north and south extension are the Fort Benton shales and the Dakota group sandstones, which are here again more or less saturated with oil. In fact, at this westerly end, opposite to the west end of the mountain and extending around it, the Rattlesnake and Big Horn oil territory come together. Here, too, the triclinal is seen to extend to the Laramie ridge on the north and west, showing that the uplifting force modified the strata for a great distance.

CHARACTER OF THE OIL.

This oil, compared with that which flows from the Dakota group of rocks near by, is light and thin, though much denser than the Pennsylvania or Ohio crude petroleum. When it first emerges it is of a greenish hue, but soon changes to a mahogany color, and is a first-class lubricant. Its odor is pleasant, balsam-like, and approximates in general character closely to the Beaver oils, the general superiority of which over all other oils for a lubricant has already been stated. An explanation of the similarity of these oils may be found in the fact that they both flow from the Fox Hills sand rock. Even if they originate far beneath this group they appear to be modified and filtered of the heavier ingredients by their passage through these rocks. The amount of kerosene or illuminating oil in this petroleum has not been determined. Its physical appearance, however, places it, as already stated, in the class of superior lubricants.

DEVELOPMENT.

Little of this has yet been done. A shaft put down on the southwest quarter of section 34, township 34, north of range 88 west, produced a small amount of greenish colored oil, which soon changed to the usual mahogany hue. Boring was also commenced here, until a depth of nearly one thousand feet was reached, but the result was the production of only water, a slight amount of oil, and a considerable quantity of gas. Successful boring will depend on the source of the oil, where stored, and how it originated. If it is mainly stored in the Fox Hills sandstones, which at their hog-back outcrop are saturated with it, then the boring should be made on the northeasterly side, and at such a distance from the exposure as to tap the oil at a considerable depth. This depth may vary from five hundred to two thousand five hundred feet. A cross section from northeast to southwest will best explain my meaning:


Cretaceous
S. W.
Talus
B
Superficial Deposits
A
Fox Hills Group
Niobrara Group
Fort Benton Shales
Dakota Group Sandstone
" " Conglomerate
Jurassic Limestone and Marls
Triassic Red Sandstone
F
C

In this case a boring at A might reach the oil at F, or it might be necessary to go still further towards the northeast and strike the Fox Hills at or near the point where the synclinal fold commenced or where a fault existed. Further study has made it possible that the oil saturated rock at B came by capillary attraction from a considerable distance and depth. It is even possible that, as at the Shoshone, the seat of the oil is in the triassic sandstone. In that case the boring would have to be extended to C, or at least to some point between A and C, where a fracture in the strata would permit the oil to come up from a considerable depth. A reservoir of oil might exist in the Dakota group sandstones and conglomerates, but even in that case the borings would have to be extended to a depth of from one thousand five hundred to two thousand five hundred feet. This point cannot be determined by theoretical considerations; only actual boring tests will settle it, and it may require, as elsewhere, many such. It should not be forgotten by oil prospectors in this district that in some of the most productive oil fields in other sections and lands, many deep holes were bored before the right spot was found where to tap the reservoirs of petroleum. Fortunately here water to supply machinery and an inexhaustable supply of coal for fuel are close at hand.

THE RATTLESNAKE OIL BASIN LOCATION.

This basin, so named from the mountain chain of the same name, lies immediately east and southeast of the Big Horn oil basin. It lies along and across a series of creeks, which combine lower down to help form the Powder River. Two routes are traveled to reach it. At Sand Creek (Ferris Postoffice) one route goes by way of the Sweetwater bridge, at Merrill's ranch, and thence by way of West Horse Creek to near its source, crossing the Rattlesnake Mountain in a northwesterly direction. The other route from Ferris Postoffice takes westerly to Devil's Gate, thence over the emigrant trail, crossing the Sweetwater opposite Lankin's ranch, thence past this ranch over Sage Hen Creek road to French's upper ranch, and thence down Deer Creek and around the west end of Rattlesnake Mountain. The distance by the former route from Rawlins is one hundred and seven miles; by the latter one hundred and twenty-four miles.

PHYSICAL CONDITIONS.

This basin has some features common with the Big Horn basin. Long lines of hog-backs characterize the district. These hog-backs have a general direction of a little south of east and north of west. Beginning at the Rattlesnake Mountain on the south, the first hog-backs are made up of the red triassic sandstones. Where the jurassic limestones and marls occur, the rocks have been eroded into a valley.

The Dakota group hog-backs come next, to the north of those already mentioned. Streams of water have cut canyons through these hog-backs, nearly at right angles to their trend; and where they cut through those of the Dakota group the oil phenomena occur. The upward movement that produced the hog-backs must have been a slow one, since the erosive action of the creeks kept pace with it.

North of the Dakota group hog-backs come the Fort Benton shales, followed in turn by the Fox Hills, and beyond, as in the Big Horn basin, by the rock masses of the coal bearing or Laramie group. The hog-backs all dip towards the northeast.

OIL PHENOMENA.

Beginning at the most westerly, known as Roger's Creek, two and a half miles east of Owen & French's lower ranch, the first important oil spring is encountered, near the base of the lower Dakota group hog-back. Here at this first escape of petroleum hardened oil occurs four hundred and fifty feet up the easterly slope of the eroded escarpment. Several small oil springs, and one quite large and noted one, occur along the lower half of the line of this oil crust. The largest spring occurs near the base of the ridge at this point. On the opposite, or eastern side of the creek, oil crust also occurs for several hundred feet up the end of the ridge, and several small petroleum springs. North of this point on the same creek, three hundred and seventy-five feet distant, a shaft ten feet deep and six feet square was put down in 1880. Here, at every visit paid to this point, a foot or more of oil was found at the bottom of the well. A second well was sunk during the same season in the bed of the creek two hundred feet from the first. It was put down eight feet to solid rock and six feet square. All around, and covering an area of several acres, was hardened oil, from ten inches to three feet or more in thickness. The hog-backs of the Dakota group, where these phenomena occur, are, as usual, made up of brown sandstone, and in the lower member of pudding stone conglomerate. These rocks are stained, and in places saturated with oil from the bottom to the top of the ridge for half a mile westward, and to the next creek eastward.

One half a mile eastward from Rogers', Murphy Creek flows through another canyon in the same general direction as the last. Here a few oil escapes and a few patches of oil cake also occur. All the rocks, however, from the bottom of the canyon to the top of the encarpments are stained or saturated with oil.

Lovett Creek lies three-fourths of a mile east of the above. Here at the base of two Dakota group hog-backs, on both sides of the creek, a great flow of oil has occurred at some time in the past, and is still in progress. Up the side of the upper (most northerly) hog-back, one hundred and twenty-five feet from the creek bed, four oil springs emerge. The oil crust is from six inches to three feet thick, and covers an estimated area of two acres. As in the preceding canyon, the upper hog-back furnishes the most oil escapes.

Graff Creek occupies the next canyon, seven-eights of a mile further east. Here about two acres of oil crust also occurs. Many small escapes of petroleum occur here on the sides of the creek. The largest oil spring here is in a morass, south of the lower hog-back. Here both oil and water emerge together. The rocks at this place, as in the canyons already described, were stained with oil for half a mile on each side of the creek.

Quinn's Gulch occurs half a mile further eastward. It rises at the base of the lower Dakota group hog-back, and in it occurs some oil crust, but no petroleum escapes were observed.

WALLACE CREEK,

Half a mile further east, is the most remarkable for oil phenomena. Prodigious quantities of hardened oil occur here. Near the base of the northern hog-back, on the east side, a shaft was put down seven feet without penetrating through the hardened oil. This crust was traced over at least three acres. At the waters' edge a considerable body of oil rises and floats away in the creek. Many other oil escapes occur here on both sides of the creek, at and near the base of these hog-backs. Examining the upper and lower, the rocks were found to be oil stained almost to Garfield Mountain, over a mile distant. Westwardly the same phenomena are visible to Quinn's Gulch, and, as already stated, for an entire distance of four miles. North of this point, on Wallace Creek, oil escapes also occur at the base and among the hog-backs of the Fort Benton shales. Over this entire district, from Rogers' Creek eastward towards Garfield Mountain (the highest peak in the Rattlesnake range), wherever oil emerges from the rocks more or less gas is constantly escaping. This is specially visible along the shores of the creeks, where oil rises through the water. During the last two years many shafts have been sunk in this basin, but none of them to any great depth, in addition to those noted in this report.

THE ROCK FORMATIONS AND THEIR THICKNESS

Is an important element in the study of this basin. These can well be seen along Rogers' Creek, passing from south to north. This creek rises in a canyon of the Rattlesnake Mountain, south of the oil springs. After flowing over granitic nucleus, the creek crosses a considerable the thickness of potsdam (lower silurian) compact, finely crystalized, hard sandstones. Lying conformably on this is a bed of finely crystalized white limestone or marble. In places there is a bed of yellowish hues. Sometimes the white marble has delicate flesh tints. Unfortunately it is too hard to become of importance in the arts. Its thickness, where measured, is twenty-five feet. This bed is almost certainly of calciferous age—the Quebec group of the Canadian geologists—and if so is of the same geological age as the marbles of Western Massachusetts and Vermont. The red sandstone hog-backs of triassic age lie unconformably against the calciferous beds. The entire thickness of the triassic beds is at least one thousand three hundred and twenty feet, and probably much greater, as the boundary between them and the jurassic could not be exactly determined, owing to a talus that covered their line of probable junction. The triassic and jurassic together, however, (jura trias, of Powell), have a thickness at this point of two thousand three hundred and sixty feet. Conformably against these lie beds of the Dakota group (in two main hog-backs from which oil escapes), six hundred and sixty feet thick. Next, and comformably to these come the beds of the Colorado group (Fort Benton and Niobrara of M. and H.), made up almost exclusively of black, light brown and ash-colored slates and shales, and at least one thousand two hundred feet thick. The Fox Hills sandstones, that occur conformably on top of the last, range in thickness here from five hundred to eight hundred feet. Some shaly strata are inter-collated among these last. On top of the latter occur the shaly and massive sandstones of the coal-bearing Laramie group, the thickness of which I did not ascertain. Owing to the removal of portions of each of these groups, exposing one after another in the form of hog-backs and gigantic steps, and their inclination towards the northeast at angles from twenty-five to forty degrees, they can easily be studied.

SOURCE OF THE OIL.

The oil that proceeds from the rocks in this basin along a distance of over four miles, either from the Dakota group rocks or the Fort Benton shales, is of the same gravity, consistency, color and odor. No differences have yet been detected of any kind between any of these springs, and this could not well happen unless they were all connected in some common source. In the Pennsylvania and some other renowned oil regions, wells often no more than a few rods apart differ greatly in the character of their oil, owing, as is generally agreed, to the fact that in such cases it proceeds from different unconnected sources. In fact, no products vary more than different oil wells, even often when they are close together. Here, however, over the space of four miles, at least, the oil is alike in every known particular, and the only suggested explanation is a common source, and if so nothing could afford it but huge underground storage rooms, approximating the length of this basin, and of unknown width. The great specific gravity of the oil (near that of water and of jelly-like consistency), would prevent it from being forced a great distance latterly. These considerations, and others which cannot be added, convince me that the real source of the oil, as in the case of the Shoshone oil, is the red triassic sandstones. It is true that where the triassic sandstones outcrop on the south side of the basin, no oil has been detected, but in lieu of that gas was in many places found to be escaping from them. As the triassic sandstones at their outcrop occupy a higher level and dip beneath the Dakota and Fort Benton groups from which the oil is escaping, it is probably stored beneath them in the triassic, and proceeds from this group through fissures produced by faulting. Gas pressure would readily, in the course of ages, drive it gradually through the jurassic marls and fractured limestones into the overlying Dakota group, the conglomerates and coarse sandstones of the latter being eminently adapted to holding the oil and permitting its gradual escape where erosion has worn down its strata.

QUALITY AND CHARACTER OF THE RATTLESNAKE OIL.

This is unique, as the following facts show. Its gravity, as already stated, is only slightly less than water, or near zero in the Baume scale. It burns only at a very high temperature. Physical and chemical tests have failed to detect any paraffine in it. The color is mahogany black. When standing for some time in its crude form, it becomes jelly-like in consistency. Its pungent and petroleum-like odor is lost on exposure. Owing to the extent and importance of this basin and the uniqueness of its oil, and to a controversy that was raised as to its character and value, the analysis by Wyner & Harland, public analysts of London, England, is appended:

"WYNER & HARLAND,
PUBLIC ANALYSTS,
37 Lombard Street, London.

April 19, 1882.

CERTIFICATE OF ANALYSIS.

SAMPLE OF OIL MARKED RATTLESNAKE.

Specific gravity 992.

Submitted to fractional distillation it gave:

Kerosene		None
Volatile below 600° F.	Lubricating Oil, specific gravity 854-860, flashing point 150° F.	29.80
Volatile at 650° F. to red heat.	Lubricating Oil, specific gravity 933, flashing point 270° F.	7.40
Lubricating Oil, specific gravity 950, flashing point 306° F.		23.00
Coke		30.
Loss in distillation, decomposition, etc		9.80
		100.00

"A portion of these oils, mixed together and tested for lubricating, have: Specific gravity, nine hundred; flashing point, one hundred degrees, Fahrenheit.

"This oil is valuable on account of the hydro-carbon which can be obtained from it by destructive distillation, by far the most important being the heavy lubricating oil, of specific gravity of nine hundred and fifty. This oil distills only at a very high temperature, considerably above the range of a mercureal thermometer, and this, taken in conjunction with its high specific gravity, should render it an exceedingly valuable lubricant for heavy machinery. It is not altered, and shows no signs of solidifying when submitted to many degrees below zero (centigrade).

(Signed) "WYNER & HARLAND."

HOW TO DEVELOP

This oil basin is an important question to those who are financially interested in it. If the main portion of the oil is stored in the Dakota group, it could be reached where the springs occur by shafting a few hundred feet. And this would be the most successful way to obtain it, owing to its density and gravity, which would not permit it to flow through an ordinary bore-hole. If, however, its seat is in the triassic rocks, somewhere near the line above which the oil is escaping out of the Dakota group rocks, a boring from one thousand to one thousand five hundred feet deep would have to be made. In this case, owing to the greater depth, little of the lighter constituents of the oil can have escaped, and hence its greater liquidity would permit it to rise in a bore-hole. Only actual boring tests can successfully settle this question.

Along the line of this basin on its northern side, oil escapes and oil saturated rock have been found several miles north of the Dakota group sandstone ridges. Large tracts of land have been located as oil territory. One company is now engaged in boring here. It is probable, however that they will have to reach a depth of from one thousand five hundred to two thousand five hundred feet before oil is struck if the theory of this report is correct.

ARAGO OIL BASIN.

Oil was first discovered here by the writer in 1880 in Township 32, north of range 86 west. Subsequently this oil territory was found to extend in a southeasterly direction across the Rattlesnake Mountain through Township 31, north of ranges 86 and 85 west. The mountain here is low and covered by the triassic, jurassic and cretaceous series of rocks. The basin lies southeast from Garfield Mountain about five miles. It is reached best from Ferris Postoffice by the route across the Sweetwater at Merrill's, and thence by the West Horse Creek road across the Rattlesnake Mountain, which passes close to this basin, the distance from Rawlins being ninety-five miles.

PHYSICAL STRUCTURE.

The same rock masses and the same general structure occur here as at the Rattlesnake oil basin, and therefore need not again be discussed in detail. The Dakota group sandstones and conglomerates are the oil producing rocks, these being underlaid by the jurassic marls and limestones, and these in turn by the triassic soft red sandstones. The Dakota group is overlaid by the Fort Benton shales, and the latter by the soft sandstones and a few strata of shales of the Fox Hills group. The latter are about four hundred feet thick, while the Fort Benton shales have a thickness of eight hundred feet. All these almost parallel lines of hog-backs dip towards the northeast at angles of from twenty-five to forty degrees, and run parallel with the Rattlesnake Mountain. The oil-saturated rocks of the Dakota group are three hundred and fifty feet thick. Northward here, where the Lăramie group would be looked for, miocene tertiary rocks are seen at the surface, and these in places come into the oil territory and overlie unconformably the Dakota group. They fill depressions caused by erosion before the Miocene lake covered this section. These tertiary rocks dip towards the mountain, while the underlying cretaceous and jura trias dip from it. This shows that in recent geological times the Rattlesnake Mountains have been subsiding. The entire length of this basin from northwest to southeast cannot be less than twelve miles, and of variable breadth.

OIL INDICATIONS.

On the southeast quarter of Section 8, where Bath Creek cuts through the Dakota group hog-back, on and at the base of the escarpment on the eastern side considerable quantities of hardened asphaltum-like oil occurs. In summer on the south side small quantities of oil flow from the rocks. A few additional oil escapes occur in the same hog-back a little further west. The rocks are more or less saturated with oil for several miles along this Dakota group ridge. In July, 1884, a shaft was put down about eighty feet north of the face of the escarpment at this place to a depth of twelve feet. At that time oil commenced to flow in at the rate of about one barrel in twenty-four hours. Mr. Dodge, who supervised the work of putting down the shaft, also reported the frequent presence of gas while the work was in progress. The real place of oil storage in this rock, however, was not reached. That exists in the pudding stone conglomerate which here constitutes the lower half of the Dakota group. As the face of the escarpment shows this to be saturated with oil, a larger flow is looked for when the shaft is once extended to that level.

The Fox Hills sandrock that occurs above the Fort Benton shales is also on this territory, in places more or less saturated with oil. Rocks of this group are stained and saturated more or less with oil, in a southeasterly direction across the mountain wherever they exist. On the south side, however, the dominant rock is that of the Dakota group, and in it an oil spring has its source.

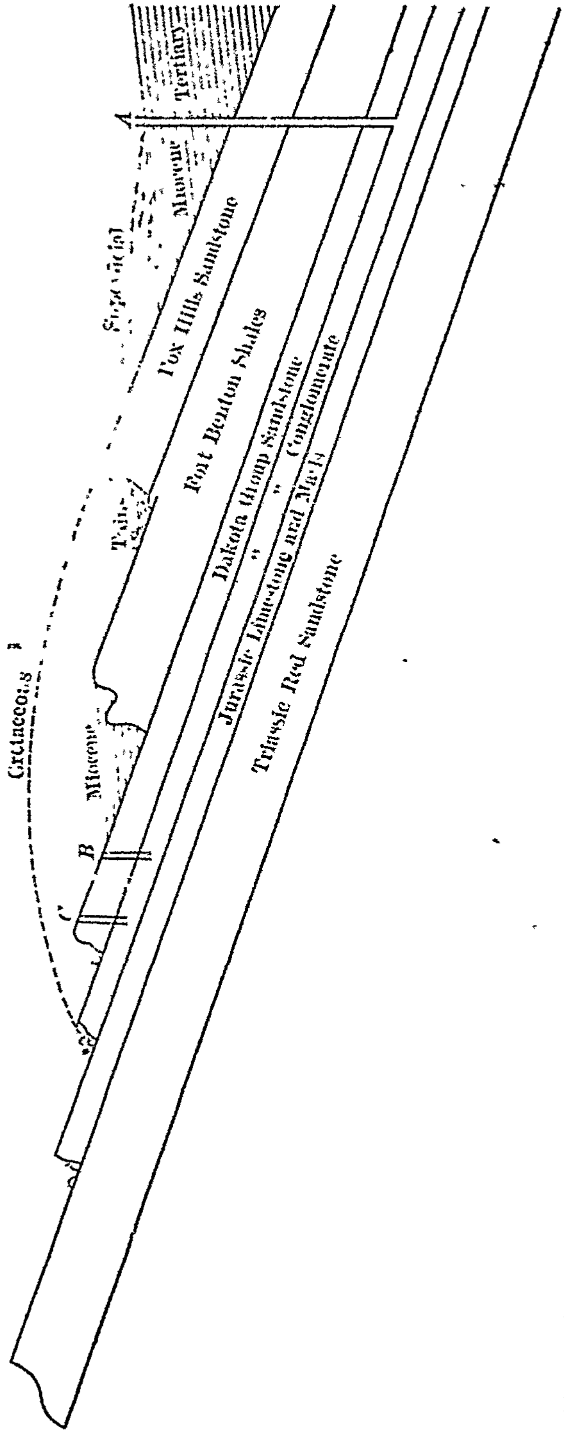
CHARACTER OF THE OIL.

The character of this oil is specially remarkable in its high specific gravity, that being below zero of the Baume scale, or over one thousand. Even before exposure, and before losing its lighter constituents, it sinks in water. It is very dense, of a dark mahogany color, and can be cut with a knife like soft butter. It gradually turns black on exposure. It has little odor as it comes out of the shaft, though what escapes from the face of the escarpment has slightly more pungency, which, however, it loses on exposure. It has a remarkably high fire test, and burns only at a high temperature. It contains no paraffine, and does not solidify at any ordinary cold below zero. While it is too thick for ordinary lubricants, it can be manipulated by combining it with lighter oils so as to make it of great value. It can be brought to any required consistency either by the Big Horn or Seminole oils, the latter to be considered hereafter. It is unique in character, and there is no doubt but that some new product can be made from it.

Southeasterly from this well and oil escape on Bath Creek, on the south slope of the mountain, the oil is of a somewhat different character. It is of less gravity and darker color, and more fluid. Although there are oil indications that connect the two points, they can have no underground connection, or less the oils would be similar. Neither of these two oils have yet been sufficiently studied to define more sharply their characters. The oil territory here, owing to its proximity to roads, its greater nearness to the railroad, and especially that portion on the south side of the mountain, promises to be of exceptional importance.

HOW TO DEVELOP.

This will vary with the locality on this territory. On the north side of the Rattlesnake, on the area of the dense oil, the strata dip towards the northeast, and it is obvious that development should be made on that side. It is extremely questionable whether ordinary borings could be made to answer here for the Dakota group horizon, owing to the thickness and heaviness of the oil. It would not rise in a boring less than two feet in diameter. It is probable that the lower Dakota group conglomerate contains thinner oil than is found in the top strata; but the improvement in fluidity with depth will not likely be sufficient to produce a flow. Under these circumstances it will be the part of wisdom to shaft from the start. The expense of going down three hundred feet with a shaft will probably be no greater than boring to the same depth with a large bore-hole. It has also been suggested that as heavy oil is obtained at a depth of twelve feet, an open cut of four hundred feet in length would be the best means of securing the oil. As the present shaft, four feet in width, produced a flow of one barrel per day, an open cut four hundred feet long, made parallel with the Dakota group ridge, should give a flow of one hundred barrels in the same time. The following cut will illustrate the structure of this basin:



It will be seen from the accompanying cut that a shaft put down at B would strike the oil-bearing strata of the Dakota group at such a depth as might determine its productive strength. A boring at A would bring to light the productive capabilities of the Fox Hills oil-bearing rocks, and if extended far enough also those of the Dakota group. A still greater depth of boring at either of those points would definitely decide the question of oil production in any possible oil-bearing rocks, including those of the triassic measures. The present shaft is at C twelve feet deep, and has brought to light, as already stated, the heavy oil of this basin. That represents the site, or a place a little north of it, of which this drawing is a cross section, and where an open cut was suggested.

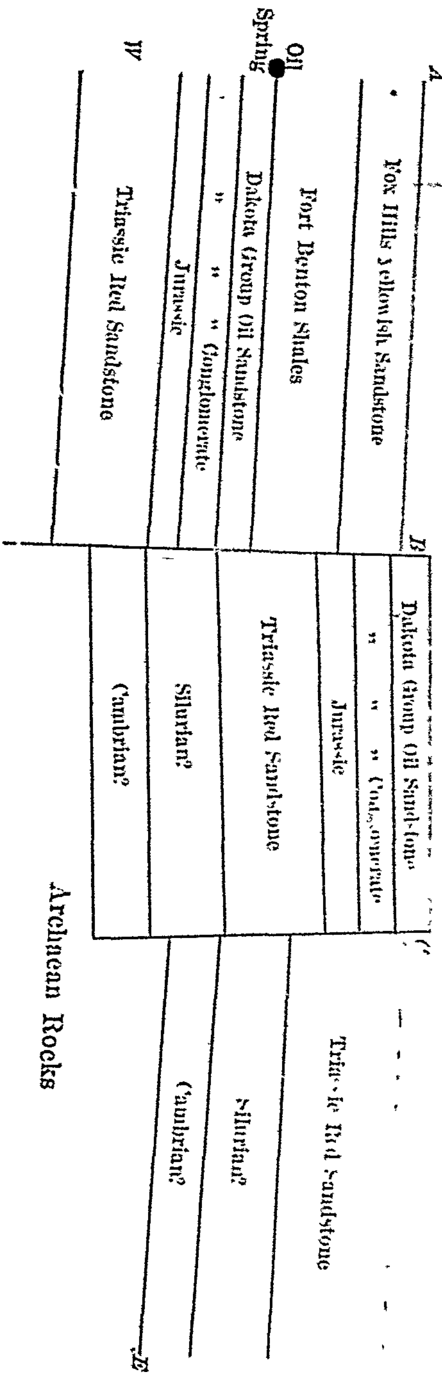
It is highly probable, however, that the main seat of the oil here is in the triassic rocks, as at the Rattlesnake, and for the same reason, to a discussion of which under that head the reader is referred. It should be remembered that the dip of the rocks as represented is, under the surface, theoretical. It may be, and in cases certainly is, much less towards the north. On that fact many who have located large tracts of supposed oil lands in a northerly and westerly direction, and also eastwardly, have in part based their conclusions. There are also practical grounds for that conclusion, inasmuch as in those directions oil phenomena, in the form of gas and oil escapes, are in places visible. In case the dip of the strata lessens towards the north, the oil horizon would be reached much sooner than the calculated depth would require.

SEMINOLE OIL BASIN.

This basin is located in Townships 32 and 33, north of ranges 81, 82 and 83 west. It is about twenty-five miles east of the Arago oil basin. It can be reached by following the overland trail from Averill's ranch, on the Sweetwater, to its intersection with the Lander cut-off road. The point of intersection of the two roads is on the basin. Following the latter road westward for four miles brings one to a point opposite a canyon in the Seminoe or Oil Mountain, as it has been named, where the most striking phenomena occur. By the overland trail from Averill's the distance is thirty-five miles.

STRUCTURE.

The geological structure is here more complex than elsewhere in this oil belt. The rocks are of the same geological age as elsewhere in the oil belt, but much more faulted, to which the complexity is owing. The Fox Hills sandstones are the most commonly exposed, and then follow the Fort Benton shales and the Dakota group sandstones and conglomerates. A cross section from west to east through this section of oil lands will best illustrate this point:



PARTIALLY IDEAL SECTIONS SHOWING FAULTS.

As the Dakota group towards the east is raised above the level of the Fox Hills, and the geological distance between them is equal to the combined thickness of the Fort Benton and Fox Hills, the fault in this case must be equal to one thousand six hundred feet or more. There is a fault of equal extent directly north in the Seminoe ridge (Oil Mountain). This ridge was evidently one of the centers of disturbance that produced these changes. The Fox Hills sandstones once evidently covered this entire area, but having been raised up to a great elevation, were gradually removed by erosion, leaving bare the Dakota group, which was itself removed further east, exposing, especially beyond the Platte, the red triassic sandstones. Seminoe ridge (Oil Mountain) is itself an anticlinal fold, the rocks dipping away from it on the south, north and east. Southeast from the end of Seminoe Mountain there is another low area of anticlinal folds in Fox Hills rocks. Towards the northeast from where the oil springs occur, the Fox

Hills group spreads out in a long, gentle anticlinal ridge, its strata dipping at an angle of from five to ten degrees. The Dakota group, however, and where the Fort Benton shales occur on its flanks, is inclined at an angle of forty-five degrees, and in places even more. From this basin the tributaries flow into the Platte, which bounds it on the southeast side.

OIL INDICATIONS.

On the north side of the Dakota group ridge, and on the east side of the canyon-like valley that here cuts through the ridge on the side of the shales, oil escapes occur, and considerable hardened oil. East of this point along the ridge the sandstones are more or less oil-stained and saturated with oil. No oil-stained rock, however, was found east of the fault at B. Whether the Dakota group and Fox Hills there never contained any, or whether it was all distilled by the movements which must have developed great heat when the faulting occurred, has not been determined. It is possible, however, and in my judgment very probable, that beneath the fault at B oil in quantity will be eventually found. The anticlinal uplift, south of the east end of Seminoe Mountain, is elliptical in shape and closed at each end. The larger axis runs northwest and southeast in the direction of Seminoe ridge. One stratum of Fox Hills sandrock, running entirely around this ellipse, is saturated with oil. Directly southeast of the preceding the rocks change to an almost vertical position, but the oil indications continue the same.

In the canyon above Seyright's (Goose Egg ranch), along the Platte, all these series of geological changes can be seen. Owing to the prodigious faulting and other changes that have occurred, the distance that boring needs to be done is perhaps more problematical than elsewhere in the oil belt.

DEVELOPMENTS.

Where the oil escapes in the canyon valley, on its east side, one shaft put down fifteen feet deep contained milk-colored water. It was put down in Fort Benton slates containing magnesia, much of the slate having an almost mud-like consistency. On the water about two inches of oil was floating at each visit to this place. The oil overflowed and saturated a considerable area. Another shaft, thirty-six feet southeast of the above, was down twelve feet to an offset, from which two additional feet in depth were cut down. This was nearly full of oil. On emptying the oil it was found to emerge from minute cracks in the Dakota group sandstones directly below, and from near the line of junction with the Fort Benton group. The dip of the Dakota group at this point shows that the oil must come from, or through, this formation. The surface here is covered, as already stated, by hardened oil, but not to the same extent as at the Rattlesnake or Beaver. Its area is probably half an acre. The flow from this well was half a barrel per day, as was found by emptying it and timing the inflow of the oil. Unfortunately this well has caved in, and is no longer open to inspection. Other wells have been sunk on this territory, but no record of their output is before me.

QUALITY OF THE SEMINOLE OIL.

The gravity of this oil is between thirty-one and one-half and thirty-two degrees, Baume. It is of an amber or light green color. A large amount of illuminating oil can be obtained from it by distillation. It contains no paraffine, and its flash and fire test are both high, but have not been definitely determined. Though producing much kerosene, it is also remarkably well adapted for making lubricating oils, especially by mixing with the high gravity Rattlesnake petroleum. One singular property of the Seminole oil is its liquefying properties when mixed with heavier petroleums. One-fourth of a pint of this oil mixed with one pint of the heavier Rattlesnake oil makes a liquid, easily-flowing petroleum. Oil experts have taken the ground that mixed with the Rattlesnake both could be piped to any required distance.

HOW TO DEVELOP.

It was observed that in sinking the well already described, the amount of oil increased with every foot of descent. At the same rate of increase it was calculated that at one hundred feet a fifty-barrel well would be produced. The oil here, as in the basins already described, is almost certainly in the triassic rocks. To reach the oil-bearing rocks, therefore, a depth approximating one thousand five hundred feet would have to be reached. Long before that depth would be attained the oil supply would probably be ample. Only actual boring, however, can definitely settle that question. At this place there are no lofty ridges to condense water and act as a source of its supply, to force the oil through strata with the energy which obtains elsewhere. Hence little of the underground treasures have gone to waste. The stores accumulated through ages are yet comparatively intact.

POWDER RIVER OIL BASIN.

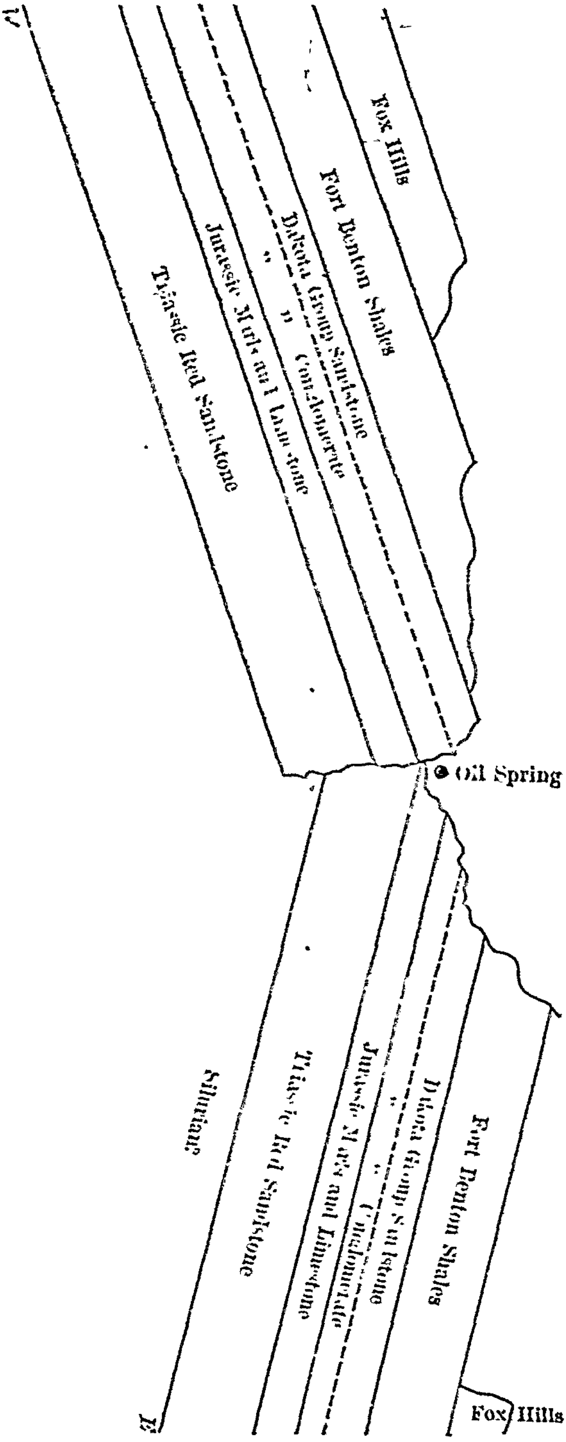
This basin is located in Townships 40 and 41, north of range 81 west. It probably will be found still more extensive in a northerly and southerly direction. It is twenty-one miles east and fifty-one miles north of the Arago oil territory. It is also fifty-one miles north and six miles west of the Seminole oil basin.

ROUTE.

The traveled road from the south leaves the Bridger trail near Wades' (F. L.) ranch, and passes due north around the east end of Pine Mountain, crossing South and Middle Casper Creek until it strikes the South Powder. From that point, after crossing the river, the direction is northeasterly along the Powder until Willow Creek, a beautiful, rapidly-flowing stream, is reached. Here the road diverges from the main traveled route towards the east, and the Powder within three miles is recrossed and the oil basin reached. This route has been surveyed by a government engineer, and recommended as the best route for the transportation of government supplies to the northern posts. This route north of Pine Mountain passes over a rolling prairie covered with wild grasses. Water is scarce between Casper Creek and Willow Creek in mid-summer, as the South Powder looses its water for much of the way in the sands of the bottom. The physical structure of the region is, however, such as certainly to make artesian water easily accessable. This entire section is eminently adapted to grazing, and from Township 39 north also to agriculture.

GEOLOGICAL CHARACTER AND STRUCTURE.

Immediately on crossing the Powder River into this oil basin, opposite to the mouth of Willow Creek, Fox Hills cretaceous sandstones are encountered, dipping westward at a small angle beneath the river. Passing eastward, through a canyon made by Munsell Creek, the Fort Benton shales are seen to underlie the Fox Hills group. These shales, where they remain uneffected by erosion, are from six hundred to eight hundred feet thick, and are here worn into numerous buttes and escarpments. They are weathered in places into a great variety of curious architectural forms. Further on, in an easterly direction, at a log cabin there is a strong petroleum odor encountered. Here, at a few points, erosion has cut through the Fort Benton shales into the upper portion of the Dakota group sandrock and conglomerates, from whence oil flows and forms petroleum springs. Immediately east of this point the Fort Benton shales again appear in lofty escarpments, but dipping in an opposite direction. Conformably to these shales, but several miles further eastward, the Fox Hills sandstones appear in lofty escarpments, forming the eastern boundary of Wall Creek. This conformation indicates an anticlinal fold, the axis of which runs slightly east of due north and west of due south, the whole earth movement that produced it resulting in an elliptical form. The central portion along the axis has been much worn away by erosion, and there the Fort Benton shales are thin or entirely worn away. The following cut from west to east will give an idea of the structure across the exis:



SECTION ACROSS THE POWDER RIVER OIL BASIN.

As will be observed from the accompanying cross section a fault exists along the axis of this uplift. Southwest of the cabins at one of the oil springs this fault is finely illustrated. There the jurassic marls are brought to the same level on the east side of Munsell Creek as the Dakota group conglomerate. A large number of lateral canyons are eroded across these groups, where the geological structure can readily be detected. Where the Fort Benton shales are worn away and the Dakota group sandstones are exposed, there oil springs either occur or oil-saturated rock. The dip of the strata towards the west and east varies from fifteen to thirty-five degrees—generally it is small.

Both north and south, and especially south, for five miles similar anticlinal folds exist. Southward there are many canyons where the erosion extends through the Dakota group, and the jurassic into the red triassic rocks, where characteristic oil phenomena exist. Along the southern side of this basin salt springs of great purity exist, forming a saline rivulet.

Over a large part of this basin fine forests are flourishing. The timber is sufficiently dense to justify the running of sawmills. This will be a great help towards developing this oil territory.

OIL SPRINGS.

While there is some sandrock of the upper (Fox Hills) series stained, and in some places saturated with oil, there is not enough to justify expectations of even small results from that source. The Dakota group sandstones and conglomerates, however, wherever they have become exposed in this basin, show more or less oil, and in places where it is cut into a few feet on and along the line of faults, oil springs occur. Conspicuous among these are the oil springs on the southeast quarter of Section 20, and on the southwest quarter of Section 16. On the former the oil emerges where streamlets have cut into the Dakota group sandrocks. Four of these occur there close together. At one point on Munsell Creek the oil emerges along a line over one hundred feet long, but most strongly at the lower end of its outflow and where the rock is cut into deepest. At some of our visits a considerable amount was stored here, but the exact quantity we have no means of ascertaining. At the most northeasterly spring at this point the amount produced per day was estimated at three barrels in twenty-four hours. Here the oil was seeping from rocks along a line for seventy-five feet. Here the largest quantity of oil was lying in depressions and eddies along the bed of a rivulet. In the remaining springs near this point the flow could not have been over one-fourth of a barrel per day.

The largest of all the oil springs in this basin is the one on the southwest quarter of Section 16. Here on the south side of a streamlet on a spot of ground sloping northward, and covering from six hundred to seven hundred square feet, the oil escapes occur. This spring was clogged with dust, sand, leaves and other debris, and partially closed the oil escapes. From the lower end of the slope several barrels of oil were daily escaping during the time of our first visit there. On almost every quarter section, except on the slope towards Wall Creek, oil indications, such as gas escapes and saturated oil rock, occurred. The great thickness of the shales overlying the sand rock prevented the oil from escaping in the form of springs. In fact, much of the territory here and adjoining it will ultimately be found to be rich in oil, the thickness of the overlying bearing strata having prevented all escape of petroleum.

QUALITY OF THE OIL.

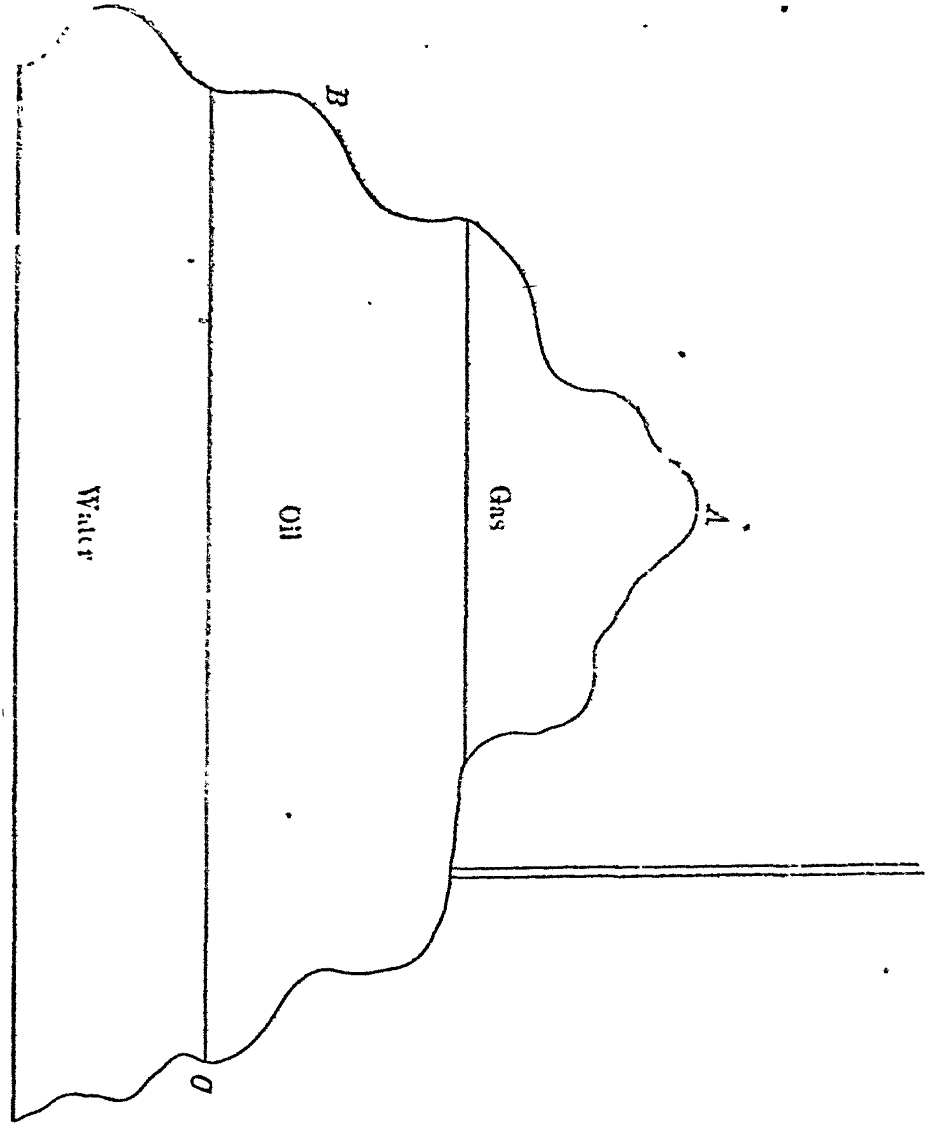
The oils from these various springs vary only slightly in gravity, and ranges between twenty-one and twenty-two degrees of the Baume scale, coming nearest in that respect, and in all other qualities, to the Beaver oil. When the oil first emerges it has a slightly greenish hue, which soon changes to mahogany and then to a black color. These oils are superior even to the Mecca oils for lubricating purposes. They can readily be decolorized and light-colored lubricants of the highest grade manufactured from them.

SOURCE OF THE OIL.

This at one time was believed to be the Dakota group sandstones and conglomerate. Developments made here, and a more thorough study of all the phenomena, have convinced me that my earlier expressed opinion was a mistake. The real source of the oil, as elsewhere in Central Wyoming, is the triassic rocks. The shafts sunken in this basin into the Dakota group and through it showed the oil to be coming still from below. In the southern part of this basin, where the upper edge of the triassic rocks are exposed, show them to be oil-saturated in some places, and in other places small oil escapes come from them. The middle horizon of the triassic measures is in all probability the seat where the petroleum is stored. The fault produced along the axis of the anticlinal created an opening through which the oil forced itself into the Dakota group conglomerates and sandstones, and even rose higher in places by capillary attraction through the shales into the Fox Hills sandstones. Since all the oil along a line eight miles in length is substantially alike, there must be an underground connection, and hence the quantity here must be very great.

DEVELOPMENT.

During the fall and winter of 1884 and 1885, shafts were sunk at the springs on Section 16, and near the cabin on Section 20. The former was put down fifty-five feet and cribbed, the entire distance being in the Dakota group rock. The flow at one time into this well was about ten barrels per day, but during the cold weather when the sides became coated with ice it fell off to less than a barrel. What the flow has been during the last summer season is not reported, I, myself, not having been able to revisit it during that time. On Section 20, near the cabin, the shaft reached a depth of twenty feet, and the well here produced a flow of about one barrel per day. The work here was much delayed by an intensely hard cap layer in the Dakota group, through which the shafting was done. The work done at this point confirmed the conclusions at which I had already arrived, that the real source of the oil was much deeper down, namely: In the triassic red sandstone. In the spring of 1885, A. J. Bothwell, Esq., commenced boring at the oil spring southwest from the cabin in the Dakota group sandstone, and penetrated three hundred and fifty feet without, however, getting deeper than into the jurassic rocks. Owing to business reasons the work was suspended temporarily, but at this writing it is about to be resumed. This boring caused the escape of large volumes of gas, water and some oil, but no extensive flow. It had the effect, however, of draining the oil springs near by; or by taking off the gas pressure caused the stoppage of the flow. It is confidently expected that when this boring reaches the middle of the triassic measures, or sooner, a largely productive well will be the result. If not here, close by, as it is well known that borings over large gas escapes are no assurance of success. More frequently the great productive wells have been found along side and close to, but not over, the gas supply. The reason of this is clear from the following cut:



A boring at A would produce only gas, and would only supply oil after the gas had all escaped, and then would be a pumping well. If the boring extended to C, water would emerge until exhausted, and the oil would sink to that horizon, when it would rise in the bore-hole. If, however, the water came into the rocks as fast as given out, no oil would ever be obtained. Only by striking the oil-holding rock at B could a flowing or spouting well be obtained. This structure of the underground oil store houses makes boring for oil a largely experimental operation.

In the southern part of this basin, along Salt Spring Creek, where red triassic sandstones are exposed, oil naturally will be encountered in much shallower wells.

SALT CREEK OIL BASIN.

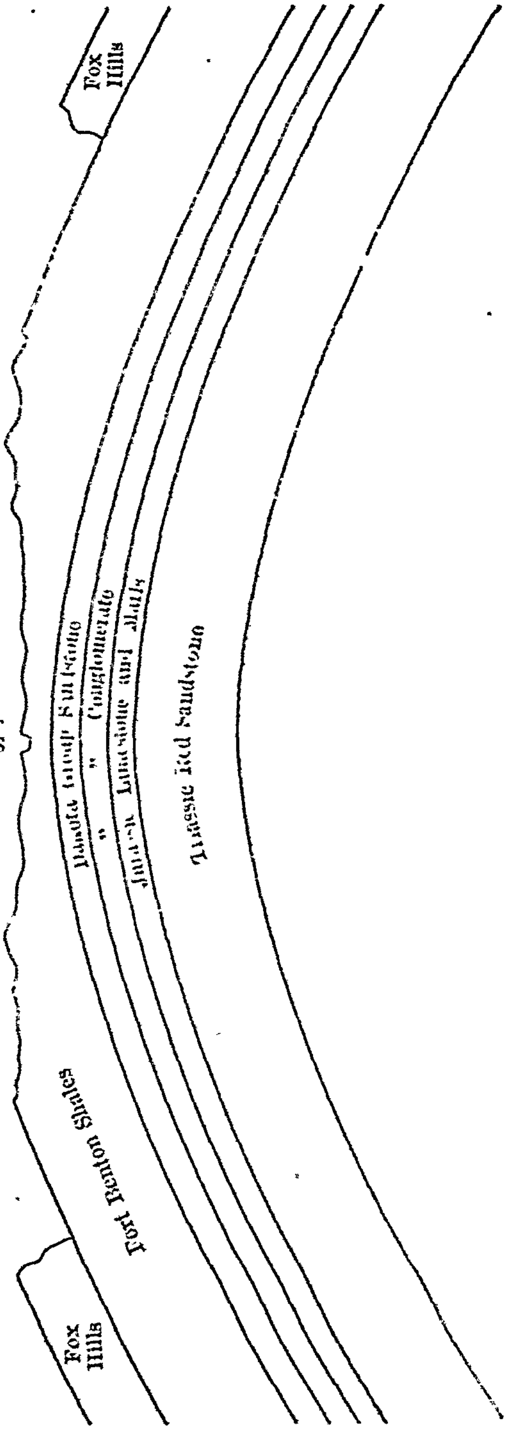
Thirteen miles east and six miles south of the Powder River oil district, an area of petroleum lands occur on and along Salt Creek, which is designated from the stream of that name. The road leading to it from the south diverges from the old overland emigrant trail a few miles west of old Fort Casper, on the Platte. For a few miles its direction is northeasterly, then due north to the head of Salt Creek, which stream it then follows to the oil basin, and thence northerly to Fort McKinney, uniting with the Powder River road near the mouth of Salt Creek. A road could readily be constructed from the Powder River oil basin to the one on Salt Creek, as I ascertained by crossing the divide between these streams in a light spring wagon.

CHARACTER OF THE ROCKS.

The geological age of the rocks is the same as on Powder River, namely: Fort Benton shales, underlaid by Dakota group sandstones and conglomerates, and these latter in turn by the jura trias. Over the Fort Benton shales the Fox Hills sandstones exist north and west of this oil district, but little of it on the petroleum-bearing territory. A thick bed of hydrated oxide of iron, combined with clay and silica, occurs in many places on this territory. In tracing it for miles its thickness varied from two and one-half to five feet thick. Its position was near the base of the Fox Hills, or at the top of the Fort Benton group. A great number of large nodules of iron carbonate (siderite) are present here in the latter group.

The physical structure of the rock masses differ from those of the Powder River. There, as we have seen, a line of faults exist along the axis of an anticlinal. Here an anticlinal fold exists, but so gentle that no break has occurred, and the shales are not eroded down to the underlying group. A large thickness of shales still remains where the oil emerges. The following cut illustrates this character of structure:

This cut illustrates the gentle character of the anticlinal, along the axis of which Salt Creek and its valley extends. The uplift must have been very gradual and long continued to permit the valley to occupy this position, and for the erosion of the creek to keep pace with it. The longer axis is proximately north and south, and the minor east and west, showing, as the surface indicates, that the general shape of the uplift is elliptical, though much less so than the Powder River oil territory. North and south of this area of folding there are similar rock foldings, but no opportunity was afforded for their study.



SECTION ACROSS SALT CREEK OIL BASIN.

EXTENT.

While some thirty quarter sections of land have here been located as oil territory, the exact boundaries have not been ascertained. Both above and below these oil lands along Salt Creek others are known to exist, but no opportunity was afforded to me for their examination.

OIL SPRINGS.

The largest oil flow is on the southwest quarter of Section 13, township 40, north of range 79 west. The oil comes up vertically from beneath on the edge, and some of it from the bottom of Salt Creek, at a point where a bank twenty-five feet high on the north side constitutes the shore line. When I last visited this spring in May, 1884, not less than twenty barrels of oil had accumulated in the creek bed. The rise of the creek from a rain fall one night washed it away, but it immediately commenced again to accumulate, and in less than a week the original quantity was stored. At that time the amount of flow was estimated at one barrel per day. Some distance from the west side of the creek, and in a northerly direction from the above spring, on the west half of Section 12, two other escapes close together occur. All these oil flows come from the Fort Benton shales, the petroleum coming up directly from below.

SOURCE OF THE OIL.

This cannot be the Fort Benton group from which the oil emerges, nor the Dakota sandstones and conglomerates directly below. Its source, in all probability, is the same as elsewhere in the basins discussed, namely: In the triassic red sandstones. It comes through all the intervening rock masses through slight fractures along the axis of the uplift. In crossing the divide between the Powder and Salt Creek, and on approaching the latter creek the Fort Benton group, where worn through to the underlying rocks, was measured and its thickness ranged from seven hundred to eight hundred feet. The original thickness of this group, along the anticlinal where the oil springs occur, could not have been less than seven hundred feet. The thickness of this group above the springs was found by measurement to be four hundred feet. This leaves a thickness of black shales of at least three hundred feet at the springs, through which the oil is forced, and also the entire thickness of the Dakota group and the jurassic, supposing our theory is correct that the oil comes from the triassic red sandstone. The entire thickness of strata through which the oil is forced by gas pressure is not less than one thousand feet. The inference is, therefore, legitimate that there must be a large amount of oil stored here, or it could not be forced through such a mass of superincumbent strata. The gentleness of the fold -no faults having occurred—is also favorable to the preservation of the oil.

QUALITY OF THE OIL.

The specific gravity of the oil is about twenty-five degrees Baume, or slightly greater than that of Powder River. At first it is of a greenish tinge, but like the Powder River oils, exposure changes it to a blackish hue. The slightest examination, such as rubbing it on glazed papers, shows it to belong, like the preceding, to the lubricating series. Of all the fine oils of Wyoming Territory I regard this, if not the finest, at least as fine as there is anywhere, not even excepting the famous Beaver oil. It will prove itself to be one of the ideally perfect lubricating oils of the globe.

DEVELOPMENT REQUIRED.

The oils of this basin are sufficiently fluid to rise in a bore-hole. Drilling, therefore, will be the method that must be resorted to. The depth at which a flow of oil will be encountered will depend on the amount of fracturing along the axis of the fold, and the gas pressure. If these two conditions should not be favorable, as we have already seen, the boring must be extended to a depth of at least one thousand feet, or even one thousand five hundred feet. Along the rim of the basin, where the original thickness of the Fort Benton shales remains, borings from one thousand five hundred to two thousand feet in depth would be required.

A practical difficulty in the way of boring exists here. The waters of Salt Creek are intensely saline. Common salt and sulphate of soda exist in it to a large amount, and some purely alkaline substances. It is doubtful whether it could be used in the boiler of a steam engine. Unless neutralized by acid—and even then, sometimes—it produces diarrhea in those who used it. Work, therefore, should be done here in spring time, when melting snows and the spring rains freshen the water. Development work could also be done in winter time, at least until the borings would give fresh water, which is possible, as well as the production of oil. While timber is not abundant, it can be obtained at no great distance, and coal could be obtained within fifteen miles of the wells.

GENERAL CONSIDERATIONS.

OIL SAND ROCK.

Frequent reference has been made to the triassic, Dakota group and Fox Hills oil-bearing sandstones. The relevancy of these references will presently appear. Sand and sandstone are a matrix for oil, and much of the oil of the globe is stored in it. Says LeConte (Manual of Geology, page 376-379): "Limestones and sandstones are always the great oil-bearing rocks. In Canada, for example, it is found mainly in limestones; in Pennsylvania, in sandstones, the under and overlying shales being mostly barren." * * * "It is found in horizontal or gently folded strata, the most productive portion being along anticlinal folds." The red sandrock of the triassic is generally quite soft, and some of it can be rubbed fine between the fingers. At the base of the deposits conglomerates prevail, and generally the contained pebbles are small and well rounded. Some strata are coarse grained, while others are fine. The red color is evidently given to it by oxide of iron. Large beds of it have ash or blueish-colored sandstone, the iron here being yet in a condition of a carbonate, but gradually becoming red by oxidation. These triassic rocks range in thickness from 1,200 to 2,000 feet, or even more, according to locality. They are visibly the great oil-bearing rocks on the Popoiagie and the Powder River, and are believed to be the great source of oil wherever it exists elsewhere in the territory.

While the Dakota group sandstones are not the primal source of the oil, they are in places oil-bearing. Their dominant color is brown. The thickness of the group in the oil belt varies from 150 to 400 feet. The lower half is generally a pudding stone conglomerate, and often very coarse. Sometimes it is very hard, but often so soft that it readily decomposes, and its debris looks like recent drift material. Above this conglomerate the brownish sandstones occur, which vary from soft to hard. When it is examined closely it is found that the color is given by the oxide and peroxide of iron, which has acted as a cementing material to bind the grains together. This group is a shallow sea deposit.

The Fox Hills sandstones are, where not saturated with oil, of a light yellowish hue, soft, loosely compacted and more finely grained than any of the preceding.

A question often asked is, how much oil can be stored in sandstones and conglomerates? This depends on its porosity, texture, coarseness and compactness. Mr. Carll (Second Geological Survey of Pennsylvania, Volume III, Chapter 24), 'found that the Pennsylvania sandrock absorbed one-tenth of its bulk of oil, and expressed the conviction that, under conditions of the pressure that is known to exist from gases in oil regions, the amount contained might equal one-eighth the bulk of the containing rock.' The amount of oil contained in large areas of such rock would be beyond belief were it not demonstrated by calculation and experiment. Following Carll's method of experiment, I found that the very coarse triassic sandstones absorbed in a few days one-ninth of its own hulk of oil: the finer samples tested absorbed one-sixteenth, and intermediate specimens one-twelfth. Dakota group sandrock absorbed one-tenth, and the soft conglomerate one-eighth of its bulk. A harder sample absorbed one-fifteenth of its bulk. Fox Hills sandstones absorbed from one-eighteenth to one-sixteenth of their bulk. Sandrock may be saturated fully up to its capacity to hold oil, or only partially so. If entirely saturated, a well with a diameter of four inches, bored through such a stratum ten feet thick, would be more than sufficiently supplied to fill the bore with oil. The amount of flow would now depend principally upon the pressure of water and gases. It might be anywhere between one and 3,000 barrels. However great the quantity of oil stored in the sandrock, the flow would not be great unless there was a corresponding pressure of gas or water, or both. Supposing the pressure to be sufficient, the following calculation might be a close approximation to actual results. If the rock, like the finer and denser Fox Hills, held one-eighteenth of its bulk of oil, then one mile square would contain 4,014,489,600 square inches in a square mile, and as many cubic inches one inch thick. Dividing this by eighteen we have 223,027,200 cubic inches of oil in a mile square of oil sand one inch thick. This would give 22,987 barrels, or 275,884 barrels if the rock were twelve inches thick, or 2,758,440 barrels of oil in a stratum of oil rock ten feet thick and one mile square. Specimens of oil-saturated rock taken from Powder River and distilled were found to contain slightly more oil than specimens artificially saturated. The same was found to be the case with specimens taken elsewhere from the oil belt. This being the case, we can take one-tenth of its bulk of contained oil as the proper amount for a basis of comparison. One square mile one inch thick would then give 4,014,489,600 cubic inches of oil, or 41,378 barrels. A stratum of such oil rock fifty feet thick would at this rate contain 24,826,800 barrels per square mile. But suppose it contained only half the above quantity, or 12,413,400 barrels, and the amount would be enormous. Even one-fourth the above amount would be prodigious. It is remarkable that the Dakota group is in places oil-stained and oil-saturated through its whole thickness, though not really the source of the oil. In the triassic the oil-stained and saturated rock is of unknown thickness, but it is known to range in a few spots for 100 feet vertically. From two to seventy-five feet in thickness of oil-saturated rock exists in some of the basins in the Fox Hills sandstones. The Fort Benton shales even contain strata of oil saturated sandstone. When now it is remembered that in Pennsylvania the oil sands range only from one foot or less to fifty feet in thickness, the superior indications for oil in the Wyoming oil belt is at once apparent.

UNDERGROUND OIL CAVITIES.

LeConte remarks that "sometimes, like water, oil is collected in fissures and cavities." The earlier view was that oil, wherever occuring, was principally stored in this way. In Pennsylvania crevices or cavities filled with oil occur principally in shallow wells. At Tidiante they occur in sandrock lying 10 feet below the river bed; at Oil Creek at 450 feet in depth; and in the first sand, near Franklin, at a depth of from 200 to 300 feet. Elsewhere in the Pennsylvania region, in the greatly productive wells, ranging from 800 to 2.500 feet in depth, deep cavities rarely occur, and are brobably never the source of the oil. As already explained, the oil is stored in some kind of sand rock. It is becoming more clear that in Wyoming the bulk of the oil is stored in the same way, the brobably exceptional places being that of Shoshone and the Beaver. Both forms of storage may, however, exist at the Seminole, owing to the faults in that field; and at Powder River and Salt Creek owing to the anticlinal folds that there exist. A region of faults contains fissures and cavities, and these are apt to be filled with oil in a petroleum field. Anticlinal folds make cavities beneath them possible; but however that may be, the rocks themselves are of a kind the best adopted for the storage of oil.

IMPORTANCE OF STRUCTURE.

Bearing on this point of the possible productiveness of oil territory, is that of physical structure. As already quoted, LeConte says that "the most productive oil territory is along anticlinal folds." That is the case in India, around the Caspian, in Transylvania, in Italy and in Pennsylvania. In six of the oil basins of Wyoming, namely: Shoshone, Beaver, Big Horn, Seminole, Powder River and Salt Creek, this type of structure is dominant. The Arago and Rattlesnake basins have modifications of this type of structure.

ORIGIN OF THE WYOMING OILS.

None of the theories thus far advanced to account for the origin of petroleum satisfy all the conditions of the problem. The theory that it is a distillation from coal is now generally abandoned. Again, it has been urged that as thick beds of organic matter in the presence of fresh or brackish water, when covered up and subjected to pressure, produced, in the course of ages, the various varieties of coal, so the same, or similar kinds of organic matter, when exposed to similar conditions in the presence of salt water, created petroleum. Prof. Newberry has given the most plausible theory, namely: That petroleum has been distilled by pressure and the heat that comes from pressure, from the bituminous shales that underlie the oil sandrock. It is based on the fact that the Hamilton shales which underlie the Pennsylvania oil sands contain from fifteen to twenty per cent. of organic matter, and that on distillation they yet yield oil. A small amount of heat exerted for a long time, it is well known, produces the same results as rapid distillation. In Wyoming the Fort Benton shales are of great thickness, after reaching 1,000 feet, and strata that, combined, reach 600 feet are common. The amount of organic matter contained in them varies from five to twenty per cent. One of the sources of this organic matter was the destruction of shoals of fishes. It is difficult to get, in some of the strata, even a small piece of shale that does not contain scales, or the impression of scales, of these ancient fishes, large numbers of which were identical with, or closely related to, the herring family. Large numbers of algæ, or sea weeds, judged from the presence of their impressions, must also have flourished in these ancient Fort Benton seas. The difference between the eastern and the Wyoming oil territory in this respect is that in the former the shales underlie, and in the latter they overlie, the source of the oil. Prof. Newberry's eminence in geology and the related sciences, has attracted much attention to this theory, and most geologists have adopted it as a working theory.

In a former publication I advocated the possibility of the formation of petroleum by chemical reactions is the rocks of the triassic sandstones. These rocks, throughout their entire thickness of from 1,200 to 2,000 feet, are made up of soft sandstones and silicious shales, and contain in their interior more or less iron carbonate. The oxidation of the iron carbonate along the plains of stratification, in the joints, and on the face of the escarpment, has given the rock its characteristic red color. This process is still going on, as can be seen in the red spotted appearance of much of the rock, and the gradual extension of the coloration into the interior. The same chemical conditions exist to a greater or less extent in portions of the Dakota, Fort Benton and Fox Hills groups, which overlie the preceding. The question suggested itself: What becomes of the carbon when the iron carbonate gives it up and takes oxygen? It takes oxygen mainly from water, thus setting free the hydrogen of the latter. The elements then that are freed are hydrogen and carbon, and if these were to unite in certain proportions, carbureted hydrogens, that is petroleums of greater or less density, would be the result. Where free carbon, for example, would be in excess in these hydro-carbons, greater consistency and higher gravity would be the result. The almost infinite variety of proportions in which the iron carbonates occur, and the very great differences in the conditions and minute structure of the rocks, and the very great variety of forms of the folded strata, can be conceived to modify the character of these hydro-carbons. But did this union of elements take place? The possibility of such a union in this way is denied, but I fail to be convinced that such reactions have not occurred. Many facts suggest such an explanation for the origin of petroleum. Among these is the occurence of simple oil stains where the process of oxidation in these rocks is now most active. Where no oil stains occur, the smell of carbureted hydrogen is distinct when rocks in process of oxidation are broken open. By the conditions of this theory the process of oil production has been specially going on ever since the close of the Laramie group epoch, when the mesozoic strata were first folded proximately into their present form. This, however, is not the first theory proposed to account for the chemical origin of petroleum, though at the time of its first publication that was my impression.

As early as May, 1866, Dr. D. P. Kayner, an excellent practical geologist, discussed the origin of petroleumin in the Titusville, Pennsylvania, Herald. He proposed the theory that petroleum originated by chemical reactions in the bowels of the earth. By the heat of the interior of the earth, "carbon vapor and hydrogen gas are evolved, and the interior of the crust being fractured by the various upheavals and subsidencies, which have been produced by igneous action from this central retort or reservoir, they would naturally rise and travel on through fissures, crevices and pores in the interior or primary rocks, to seek an exit from the burning vault, leaving solid particles along their track to form asphaltum beds, and rising to a point where the internal forces are balanced by the compressing and cooling powers of the surface, would there condense to form petroleum, paraffine and napthaline, while the lighter elements, which cannot be compressed under that pressure, still retain the gaseous form and push through the superincumbent strata, and travel on to where the seamed slate rock outcrops at the margin of a pond or lake, or in some stream of water, and escapes at the surface."

Ever since M. Berthelot, of Paris, succeeded in forming petroleum by chemical reactions, the opinion has been growing that in some way in the earth's great labaratory petroleum is still in process of evolvement. At least, no strong theoretical objection can any longer be urged against this explanation of the origin of mineral oil. This subject has engaged the attention of many investigators. One of the latest and ablest of these investigators is Dr. Carl Ochsenius, professor of geology in the University of Marburg. As his theory is radically different from that of any other that has come under my notice, it is here reproduced. "Petroleum," he says, "is formed where a strong stream of down-coming mother liquor suddenly destroys all flora and found contained in an oceanic bay. The accumulated cadaverous remains become thus covered up with an impermeable sediment of silt, clay, etc., furnishing then the material for the liquid carbon—hydrogen compounds; these sometimes becoming free, impregnated other strata." (Ochsenius, Petroleum—Bildung, Natur, No. 29, 1882, Halle. Geological Magazine, July 1884, London). What he means by mother liquors are 'magnesium salts in a state of solution, along with chloride of potassium and lithium and some borates, and formed in a bay or estuary separated from the ocean by a horizontal bar.' In such a bay, rock salt, gypsum, and the organic constituents from the shore, together with salt clay, are precipitated. The salts remaining in solution are mainly chloride of magnesium, potassium, lithium, along with some borates, and these, as stated above, are mother liquors, and the causal forces that transmute organic matter, when brought into contact with it under proper conditions, into petroleum. As yet few have adopted this theory of oil formation, as it does not account for as many phenomena in the petroleum fields as the view of Newberry.

On any theory of oil production the materials for it exist here in superabundance. If Newberry is correct that petroleum originates from the shales by natural distillation, they exist here in much thicker strata than in Pennsylvania and Ohio. If coal is the source of the oil, it also exists near by, and once overlaid some of these basins before erosion removed it. If sandstones which now hold the oil are also the seat of its generation, they are here in prodigious abundance. If petroleums were formed by mother liquors, as Ochsenius claims, their former abundance is evident from the magnesian earths and shales that occur on the Beaver, Seminole, Powder and Salt Creek oil basins. All the possible sources of petroleum exist here on a colossal scale.

PROBABLE OIL FLOW.

The abundance of an oil flow is conditioned by other factors than the quantity stored in the containing rock. The density of the rock, thickness of the oil, the amount of gas generated, and the amount of water present, all effect the flow. The Wyoming oil sandrock will average denser than that of Pennsylvania. The gravity of the oil is also greater, and it is questionable whether gas is so rapidly evolved or whether it is so large in quantity. For these reasons so many large and flowing wells should not be expected here as exist in the eastern oil field. On the other hand, the flow will be long continued, as is almost universally the case in the compacter sands. Wells may be bored that will produce hundreds; but none that will give thousands of barrels per day.

COMPARISON WITH OTHER OIL REGIONS.

By reference to a map of Wyoming Territory, it will be seen that the Shoshone and Washakie oil basins run nearly parallel to the Wind River Mountains, and the Beaver to a chain south of it. The Dutton, Big Horn and Rattlesnake oil basins run parallel with the Rattlesnake, or to the west of it. The western end of this chain, where the archæan rocks were exposed, was a shore line during the ages when the oil-bearing rocks were laid down as sediments. The Seminole and Powder River oil basins also occur along or near ancient shore lines. The two most westerly basins had the Wind River Mountains for their ancient shore lines. In other words there were dry land surfaces close to the oil basins during the ages of their formation. The rocks of these ages, and notably that of the triassic, exhibit that plunge and flow structure through their entire depth which distinguishes such deposits. Shallow seas or shore lines abounded. The great thickness of rock occurred by a subsidence of the sea bottom, at least near the shores during the progress of the age, about as rapid as the accumulation of sediments. Though the eastern end of the Rattlesnake Mountains are covered by cretaceous deposits, they have all the characteristics of shallow sea deposits. In the Powder River oil territory the underlying rocks show the same marks of an off-shore formation, such as the plunge and flow structure, pudding stone conglomerate and occasionally thin beds of breccias. Often there, when a conglomerate is followed for a short distance, it shades into a coarse and then in a fine sandrock. At the Salt Creek basin the oil rock is not exposed, but there is little doubt that future investigation will there bring the same underground conditions to light. These facts thus far correlate the oil-bearing rocks of Wyoming with those of Pennsylvania and India. Mr. Carll, in the report already quoted, (Second Geological Survey of Pennsylvania, Volume III, Chapter 23), concludes, after an exhaustive examination, that the Pennsylvania sands are shore and off-shore deposits, and "the re-arranged materials of other ancient shore deposits," and that the various wells tap them, and are the most productive where they were originally sursounded by practically impervious rocks.

In regard to the geological horizon at which the oils are found, the Wyoming petroleums differ extremely from those in Pennsylvania. There they occur in the devonian formation, but this formation is entirely wanting in the oil belt of Wyoming. In other words, while the rocks of the Pennsylvania oil fields were in process of being laid down at the bottom of the ancient devonian seas, the oil belts of Wyoming were dry land surfaces. If even the shortest estimates of geological time are accepted, millions of years must have elapsed between the close of the devonian age and the beginning of triassic times, when the rocks that hold the Wyoming oils began to be laid down. The two oil-making epochs were separated by the whole of the carboniferous and permian ages. The rocks, therefore, that furnish petroleum in eastern North America were producing, and necessarily, in places, wasting their oil resources countless centuries before the strata where the Wyoming oils had their birth even commenced to be formed.

There is, however, some analogy between the great oil fields of the world. The Pennsylvania oil sands, for example, are in the Chemung group of the devonian, and the source of it, according to Newberry, is the underlying Hamilton shales, the middle member of the same formation. Its store house is the sandrock lying above the shales, and ranging in thickness from two to fifty feet, and rarely as high as seventy-five feet. Above the devonian, sometimes directly above and sometimes far off, are the great carboniferous coal beds. In Wyoming the triassic and the cretaceous, above where the oil of Wyoming is stored, is also composed of sandstones, shales and slates; and the Laramie, which overlies them, is the great source of the lignite coal of the Rocky Mountains. The conditions for oil and coal that existed in Pennsylvania in devonian and carboniferous times, did not occur in Wyoming until triassic, cretaceous and Laramie group epochs. While, however, the oil containing and producing rocks in Pennsylvania are only from 1,200 to 2,000 feet thick, in Wyoming the petroleum strata range from 4,500 to 5,500 feet, or more than twice the thickness of the eastern field.

It is not long since even geologists of note regarded the idea of there being great coal fields in the Rocky Mountains as preposterous. No one doubts that now who has the least idea of this field. Every year's investigation is still futher enlarging it, and now it is becoming apparent that it is not inferior in extent to the eastern coal fields. Judging from the facts observed in the Wyoming oil belts, the petroleum here, in extent of territory occupied by it, and in quantity, promises to be at least correspondingly great, and in quality to be without a peer anywhere in the world.

Being so much more recent, geologically, unique in character, and extended along long lines, it would be a mistake to judge Wyoming oils by the eastern standards. They can only be understood by an independent study of their own present condition and past history.

VALUE.

When transportation is once provided, and any one of these oil basins are once worked on business principles, they will develop into magnificently paying properties. Remembering that the oils are the best of mineral lubricators, the following calculations will show their value. Most of the basins described could be made to produce at least 600 barrels per day. Composed of kinds always in demand at good prices, it would be safe to count on a profit of five cents per gallon. This would figure out thus:

Six hundred barrels per day (forty-five gallons per barrel at five cents per gallon (22,500 gallons), $1,125; at 300 work days per year. $337,500.

Throwing away for loss in making up the 600 barrels of lubricants what flows on Sunday, and not counting axle grease and other products that could be made, the above amount is a good dividend on a large capital. Most of the basins (transportation being provided) could readily be developed into as profitable properties. These properties have great prospective value also, owing to the gradual increase of consumption and exportation over production in the eastern oil field. In 1885 the exportation was greater than in any previous year, equaling ten per cent. over that of 1884. Home consumption is also increasing. At present the production is about 55,000 barrels, while the consumption is close to 68,000 barrels per day. Thus the accumulated stores are being gradually used up.

PHYSICAL GEOGRAPHY.

All the oil basins, except those on Powder River and Salt Creek, lie along or close to the line of forty-two degrees and forty-five minutes, and between or close to the meridians of one hundred and eight degrees and forty-five minutes and one hundred and seven degrees. Those on the South Powder and Salt Creek constitute another line of oil territory. This entire oil territory in turn occupies a larger basin surrounded by mountains. On the east is the Casper range; on the north are the Big Horn Mountains, which, west of the river of that name, are known as the Owl Creek range; on the west the Sierra Shoshone; and on the south the Rattlesnake range, which, along most of its course, deserves the name of mountains. The average elevation of the Owl Creek range is 8,250 feet. The peaks of the Sierra Shoshone range reach 10,000 feet, the culminating points being the Washakie needles, 12,253 feet high, near their southeastern end. The height of the Rattlesnake range averages 7,500 feet, the culminating point being Garfield Peak, which reaches an elevation of 8,500 feet.

The elevation (barometrical) at some of the principal points is as follows:

Shoshone oil basin (Cap. Jones)	5,000 feet
Beaver oil basin	4,800 feet
Dutton oil basin	5,700 feet
Big Horn oil basin	6,200 feet
Arago oil basin	6,275 feet
Seminole oil basin	5,600 feet

Powder River crossing	5,690 feet
Powder River oil basin	5,250 feet
Salt Creek oil basin	5,190 feet

It will be seen that this oil region of Wyoming is a huge basin surrounded by lofty mountain chains. The drainage of the greater part of this region is towards the north, the exception being the Arágo and Seminole, which is eastward. The average elevation of the whole region inside of the mountain chains is somewhere near 5,400 feet. Hayden makes the elevation of the Wind River valley, on the authority of Major Baldwin, 5,000 feet. The extent of this large basin is about 11,000 square miles, it being proximately 75 miles from north to south and 150 miles from east to west. The surface features are varied. Many beautiful broad bottoms border the rivers and smaller streams. Between these are occasional level stretches of land, but many broken districts and low ridges, some of which are of the hog-back type, and often precipitous. Towards the Beaver, and at a few other points, are some bad lands of miocene tertiary age.

DRAINAGE.

The drainage is principally into the Yellowstone through the Wind and Powder Rivers, the exception being the few streams that flow into the Platte. The Wind River, rising in the mountains of that name, flows eastward for seventy miles, then heads north until it reaches the Big Horn Mountains. Its valley is 200 miles long and from one to fifteen miles wide. On the Little Wind River, a tributary of the Big Popoiagie, below Crow Buttes, there is much fertile, gently rolling land. Along the foot of the Wind River Mountains there is also much fine land. The tributaries of the Wind River are, however, specially favored. The Big and Little Popoiagie and their many tributaries have some fine bottoms, and the streams themselves flow over pebbly beds much of their way. The water is clear as crystal, cold and filled with trout. The Beaver, which rises in the Rattlesnake Hills, is at first a clear and beautiful stream. When it strikes the enclosing banks of the miocene deposits, the alkaline earths give the water a milky appearance. The Beaver valley is, however, a fine body of land, and for thirty miles its bottom is composed of the best river alluvium. The bottom is from one to five miles wide, and can readily be irrigated. Many of the tributaries of the Beaver equal it in agricultural promise. Near the base of the Rattlesnake Hills, on the Beaver, is a remarkable hot spring, covering several hundred feet. The water flowing from it is strong enough to turn a mill. In this wild picturesque region there are many other springs, fresh and mineral, that railroad communications would make it a health resort.

Some of the streams that drain into the Wind River from the east only flow over their entire distance during a part of the year. In mid-summer and autumn, after flowing some distance from their source, they sink into the sands. Some of them have beautiful wide bottoms. On the eastern tributaries of the Wind River there are some alkaline springs and small streams whose waters are unfit for human use and are scarcely fit for cattle.

POWDER RIVER.

The main direction of the South Powder from its source in the Rattlesnake range is northeasterly. Early in its course it meanders through a narrow bottom, the northern uplands of which become, near the crossing of the Buffalo road, long gentle slopes. On the south side the Fort Benton shales are cut into curious architectural forms, the cone and pyramidal shapes being dominant. These localities are sometimes called "Bad Lands," but they have more vegetation than the Bad Lands proper, which also belong to another geological age, namely: The tertiary. Further on the landscape becomes more and more gently rolling, and wide stretches of surface appear of the highest natural fertility, only needing more moisture to make them models of prospective agricultural wealth. Within fifteen miles of its source the South Powder in summer sinks in its bed, and water appears only in places at intervals of from two to five miles. Anywhere, however, water can be obtained by sinking holes in its bed from three to ten feet deep. The structure, however, of the underlying rocks is of such a character as to give promise of abundance of water from artesian wells. In T'p 41 north, Willow Creek, a beautiful, rapid stream, coming from the west, enters the South Powder and causes a full current in its bed to its juncture with the main Powder.

The Casper Creeks—West, Middle and South—drain a considerable area towards the eastern portion of this great basin. West Casper rises at the northeast base of Garfield Mountain. Some of its tributaries rise in Pine Mountain, a lofty ridge twenty miles north of the Rattlesnake range. In many places broad bottoms characterize these streams, containing natural meadows and adapted to agricultural use. The Poison Spider, which rises a little further east than Casper Creek, flows eastward through a bottom that in places spreads out to a width of from one to four miles. The former unites with the Platte a few miles west of old Fort Casper, and the latter near Searight's (Goose Egg) ranch.

CLIMATE.

It has already been observed that the average elevation of this territory approximates to 5,400 feet, which is much less than that of Cheyenne or Denver. It is also surrounded by mountain chains, and the greater part is thus shielded from the severer storms of these latitudes. When severe cold occurs it rarely lasts long. Snow seldom lies long on the ground. The winter of 1881 was one of the severest yet known, and yet the unsheltered cattle lost here was not over two per cent. of the whole. Indian summer weather generally extends to the middle of November, and often far into December. Species of plants flourish here which are common to Southern Colorado. This judgment about the mild climatic conditions is fully confirmed by the experience and statements of cattlemen residing in this basin.

The rain fall in inches has not been ascertained ,but it is greatest in April, May and early June. It is sufficient to produce luxuriant growths of grasses, sage brush, grease wood, and on the more elevated ridges and some of the low bottoms a tree flora and a multitude of flowering plants. It cannot be less than twenty inches per annum over this territory, with vastly more on the bordering mountains. The great number of springs in the mountains and streams issuing from them is evidence of this statement.

Besides it is well known that a tree flora does not flourish where the rain fall is much less than thirty inches.

VEGETATION.

The dominant tree forms on the mountains, especially on the sides, are pines and cedars. Low down on the slopes and on the bottoms, cottonwoods, willows, box elders and the buffalo berry shrub occur. Rarely two species of fir are found on the mountains. The timber often extends a considerable distance down the streams at the foot of the mountains. Some of the low ridges east of the South Powder have in places densely wooded tracts, and elsewhere straggling trees. Large tracts in the interior of this territory are either destitute of or only sparsely covered areas of timber lands. In regard to humbler vegetable forms, the same great variety of flowering plants exist here that delights the botanist in the most favored nooks of the Rocky Mountains. The grasses of many varieties flourish everywhere, except in localities where the country has been overstocked with cattle, and where weeds now partially usurp their place. Even the ridges and mountain slopes and parks are clothed with grasses. On the lower lands, various species of sage brush are common. Grease woods and allied forms are also abundant. In April, May and June this almost entire territory is a vast flower garden. Autumn also has its floral riches, but at this season yellowish hues are too common to satisfy the taste for the beautiful.

FAUNA.

Though it does not come within the province of this report to discuss animal life, the subject cannot be entirely ignored. Perching birds abound. Swimming birds—ducks, geese, etc., are common on the streams during their migrations, and many breed here. The plover family is well represented. Sage hens are in places so common that they soon cease to attract attention. The pine grouse is met with on the timber-covered ridges and mountains. Rodents, from squirrels, mice, cotton-tails, jack rabbits and prairie dogs to the mountain rat are encountered almost everywhere. The noble beaver was formerly common, and is still found on some of the streams. Antelope are still numerous, and deer and elk are yet hunted successfully. A few buffalo still linger in the solitudes. An occasional gray wolf, a few foxes, weasels, mink, mountain lions, and many coyotes well represent the carnivora. In the higher border region the black and cinnamon bears are found, and the mountain sheep is still king. All the larger wild game, except the antelope, often migrate to the mountains when the increasing cold requires the protection of forests, or summer heats make it desirabe. Were it not for intrusive and destructive man, this whole region would still be, as it once was, a paradise for wild animal life.

AGRICULTURE.

The home of the antelope, deer, elk and buffalo cannot be a desert. In fact, of the 11,000 square miles of this basin not less than 3,000 can be brought into successful agricultural use. That much land, at least, can be irrigated, and wherever water is supplied crops do well. This is not mere theory. On the Little and Big Popoiagie, fine crops of the cereals are now being produced. The oats yield is from fifty to sixty bushels per acre, weighing from thirty-eight to forty-two pounds per bushel, and equal in grade to the finest produced in Scotland. The land produces fine wheat at the rate of from thirty-five to forty-five bushels per acre, and weighing from sixty to sixty-four pounds. Rye, barley and all the root crops do equally well. All these crops, wherever tried, do equally well in the Powder River region. There attempts are being made to raise the small fruits and apples that promise to be abundantly successful. Add to the agricultural resources the great stock industry, and it will be seen that this basin is of great intrinsic valve for many interests besides that of oil.

MINERAL RESOURCES.

These can only be alluded to here. Oil has been discussed. Next in importance is coal, which exists in inexhaustible quantities. Gypsum occurs in many places, and on the Little Popoiagie, at the Shoshone oil basin, in beds forty feet thick. Gold exists in Wind River mountains, where there is a revival in that mining industry. Both gold and silver occur in the Big Horn Mountain, and in other portions of the chains that surround this territory. Large beds of spathic iron ore (iron carbonate) and hematite are also known to occur in this territory.

CHART OF GEOLOGICAL HISTORY, GIVING THE AGE AT WHICH OIL WAS FORMED IN DIFFERENT COUNTRIES.

ERAS.	LIFE.		PERIODS.		EPOCHS.	AGE OF OIL SANDS AND SOURCES.
Psychozoic.	Age of Angiosperms and Sperms.	Age of Man.		Human.	Historical.	
Cenozoic.		Age of Mammals.		Quaternary.		
				Tertiary.	Pliocene.	
					Miocene.	California oil.
					Eocene.	India ex. peninsular oil.
Mesozoic.		Age of Reptiles.		Cretaceous.	Laramie.	Coal Wyo., Colo., N.M.
					Fox Hills. Fort Pierre.	Further India oil, Wyo. at Beaver, Big Horn, Seminoe, etc.
	Age of Cycads.				Niobrara. Fort Benton.	Oil at Dutton, Salt Creek, Wyo. Shales.
					Dakota Group.	Oil at Big Horn, Rattlesn'k, Arago, Seminoe, etc
				Jurassic.		Oil at one point on Powder.
				Triassic.		Oil at Shoshone, Washakie, Powder R, and source of all Wyo. oils.
Paleozoic.	Age of Acrogens.	Carboniferous, or age of coal, plants and amphibians.		Permian.	Permian.	
				Carboniferous.	Upper Coal. Lower Coal. Conglomerate.	Oils in Ohio.
				Sub-carbonifr's		Oil in W. Virginia.
		Devonian, or age of Fishes.		Catskill.	Catskill.	
				Chemung	Chemung. Portage.	Oil horizon in Penn'a.
				Hamilton.	Genesee. Hamilton. Marcellus.	Oil of Pennsylvania believed to have originated here.
				Corniferous.	Corniferous. Schoharie Cauda-galli.	Oil at Enniskillen, Canada.
				Oriskany.		
	Age of Algæ.	Silurian, or age of Mollusks.	Upper Silurian.	Helderberg	Helderberg	
				Salina.	Saliferous.	
				Niagara.	Niagara. Clinton. Medina.	Illinois, near Chicago.
			Lower Silurian.	Hudson.	Hudson. Utica.	Canada. "
				Trenton	Trenton. Chazy.	Canada.
				Calciferous	Calciferous.	
				Cambrian or Primordial.	Potsdam. Acadian.	
		Archæan.		Archæan.	Upper Laurentian. Lower Laurentian.	

GEOLOGICAL HISTORY.

In order to obtain a clear understanding of the oil basins of Wyoming, it is necessary to give a brief sketch of their geological history. The chart on the preceding page should be consulted in order to obtain a clear conception of the relative position of the principal oil basins of the world.

In Wyoming the mountains that bound the oil area described have an archæan nucleus. The rocks are mainly granatic in type, and contain much syenyte, gneiss, and related masses intersected by dikes of greenstone, dioryte, porphyry, quartz, etc. These nuclei, which are now sometimes bare, and sometimes covered with sedimentary deposits, probably constituted a portion of the primitive, and so far as we can now see, the first land masses of the Rocky Mountain region. Against them beat the billows of the old silurian ocean, and worn down from them, aided by the rains and storms, and the probable excess of carbonic acid in the atmosphere of those times, the materials to form the old Potsdam sandstone. These lie on the flanks of the mountains. They are hard, sometimes finely grained, and almost quartzitic. They probably overlie the archæan rocks through the greater part of this territory. Overlying these Potsdam sandstones, in the Rattlesnake range, are hard marbles and limestone, which were laid down when the ocean bottoms had subsided, and subsequently were crystalized into their present form. This epoch is the calciferous, and is often called the Quebec group. The marbles of Western Massachusetts and Vermont belong to this epoch. Similar beds occur in the Owl Creek range, but their equivalents along the Wind River Mountains, are dolomytes, the whole there being about 200 feet thick.

No memorials of the next two periods of the lower silurian—the Canada and Trenton—have yet been found anywhere in this section, and therefore it is inferred that this portion of the continent was then a land surface. The next age (upper silurian) is only represented in the Sierra Shoshone Mountains by the Niagara group. A deep sea must have invaded that portion of the basin, and then retired by the beginning of the salina period. From thence onward through the upper silurian, and the whole of the devonian, this section was again a dry land surface. It remained so until the carboniferous age dawned, when that portion of this territory west of the Popoiagie was again submerged, and there the deposits of this epoch are found. At the close of this epoch, as is well understood, the whole continent was rising and continued to rise far into the permian, until it stood at or near its present level.

That the transition from the permian to the triassic, or from the palæozoic to the mesozoic, was a gradual one is generally admitted. The apparently sudden change in animal and vegetable forms is fully accounted for by the absence of transition rocks. This, in turn, is accounted for by the land surface condition of North America as a whole during the latter half of the permian and the earliest triassic. This portion of the Rocky Mountains under discussion had commenced to subside towards the end of the permian, continued that process until the ocean waters rolled over it. This gave the conditions here needed for recording the coming events of world history—the laying down of sediments in which should be stored the life of those times. That subsidence was in progress during the whole of the triassic is evident from the fact that from the bottom to the top of the deposits, even where 2,000 feet thick, ripple marks are as distinct as on a modern sea beach. At Red Canyon, south of the Shoshone oil basin, the plunge and flow structure and ripple marks are seen from the bottom to the top of the deposits. This structure is common in numberless other basins. They could only have been formed through such a thick mass of deposits by a subsidence so slow as to keep the bottom near the surface—subsidence no more rapid than the deposition of sediments. The triassic rocks underlie the greater part of the area under discussion, and where not observed pass beneath rocks of later geological ages. Exposure in long lines of hogbacks, often assuming the forms of great ellipses or circles, are common over the southern part and especially the southwestern part of this territory. They again crop out in the eastern part, near to and at the Casper, and along the

Big Horn Mountains, where the exposures stand in eroded folds, some of which stand almost vertically. The rocks vary little over wide areas. The pudding stone conglomerate, found near the base, only changes to greater or less fineness of its constituents. The characteristic color—brick red—so often alluded to, of various shades, is due to ferric oxide, which generally covers the exposed surfaces, joints, cleanage plains, etc. Often on breaking the rocks the inside is gray, blueish gray or ash color, due to the iron still present in the form of carbonate. It is the slow oxidation of the iron which makes so much of this rock spotted, and is gradually changing the whole into a brick red color. Some of the rock layers are quite hard, while the greater number are soft. In some sections some layers contain allumina and are fissile, and produce fine flagging stone, while the more massive produce a fair quality of building stone. Beds of gypsum come in towards the upper portions of the deposits, some of which approximate forty feet in thickness. At the Shoshone oil basin the gypsum beds in the triassic, combined with those above in the triassic, make a vertical thickness of over 100 feet. Thin beds of gypsum, in the form of selenite, occur as far east as the Rattlesnake oil basin. It is at the middle horizon of the triassic that the large flows of oil come from at the Shoshone. As already explained, the triassic rocks are almost certainly the principal store-house of the Wyoming petroleum.

The jurassic rocks are not separated from the triassic by any sharp lines of demarkation, and the two are frequently combined under the name of the jura trias. Beds of shale, arenaceous, ash colored marls, fissile and compact limestones are the characteristic rock forms.

The physical conditions that characterized the region during the progress of the jurassic were somewhat different from those of the triassic. The subsidence during a portion of the age was more rapid than the filling up, so that deep seas prevailed during its progress, and more calcareous and less arenaceous matter was deposited. There were intervals of interruption of communication with the main ocean when the jurassic sea was losing its waters, mainly by evaporation, when gypsum beds were laid down.

The close of the jura trias was a period of great orographic changes. The Wasatch range was then born and the mountains of the Salt Lake basin produced. The Sierra Nevada uplift also then took place. The continent was so lifted up that the succeeding cretaceous formed no deposits in the early part of its history, and nowhere at any time between the Wasatch and Sierra Nevada. When the earliest cretaceous opened, represented by the Dakota group, the lower European cretaceous had already been laid down. The continent had been raised probably, at least to its present level, by the jura trias revolution, and the slow subsidence which followed finally let in the Gulf of Mexico, which, extending in a northwesterly direction over the plains and through the mountain regions, inaugurated the commencement of the depositions of

THE CRETACEOUS PERIOD.

The various groups of this period are well represented in the oil territory. They are here conformable to the underlying jura trias. Shallow seas abounded during the Dakota group epoch. Its sediments now appear as dark and light brown sandstones, with occasional layers of yellow type. Colored clays and seams of white sandstone and quartzite are more rarely encountered. Sometimes seams of carbonaceous shales occur. The rocks are generally coarse, and the lower half is conglomerate. The cementing materials are iron oxides.

These rocks at the Popoiagie, some distance back from the oil basin eastward, overlie the jura trias, but contain no trace of oil in that section. Further east along the Rattlesnake, Big Horn, Arago, Seminole, and Powder River, these rocks hold oil as already stated. Its thickness over this territory ranges from 300 to 400 feet.

The Fort Benton group, lying immediately above, has been united with the Niobrara, by Hayden and King, under the name of the Colorado. This was done because of the difficulty in the mountains in distinguishing between them. I prefer the original name, and use it to designate that immense body of grayish, blueish and black slates and shales and siliceous limestones that lie above the Dakota group sandstones. Its plastic black clays characterize vast extents of country along and eastward of the South Powder. Along the Rattlesnake the slaty portions form hog-backs. Some strata are so fissile that they split into uniform slabs the thickness of pasteboard, and even thinner. Almost every piece is marked by fish scales, showing the former existence here of an enormous quantity of this type of vertebrate life. Deeper and quieter seas prevailed than existed in the Dakota group epoch. At the top of the Fort Benton group are layers of yellowish arenaceous and shaly limestones, with casts of shells which represent the Niobrara group, but the exact boundary between the two cannot be made out. The thickness of these two groups, considered together, ranges in this territory between 400 and 1,200 feet. Oil emerges from the Fox Hills shales, on Salt Creek, at the Seminole, and at the Dutton basin, as already stated. Because some of the beds contain from ten to fifteen per cent. of organic matter, color is given to the theory that the oil is distilled in Nature's labratory from them. Large quantities of siderite (iron carbonate) in the form of nodules, and on the Powder in layers, occur in this group. A large amount of iron carbonate is also disseminated through the gray and ash-colored slates aud shales.

The Fox Hills group, lying immediately above the preceding, is now made to include the old Fort Pierre. Soft yellowish and grayish sandstones, some arenaceous clays, and micaceous shaly sandstones near the base characterize this group. A characteristic feature is the presence of cannon-ball concretions, ranging in size from a walnut to five feet or more in diameter. Where they weather out and cover the ground, they simulate piles of cannon-balls. Sometimes in breaking them open a fossil is found in the center. Conglomerates occur less frequently in this group than in the Dakota. The thickness of this group in the oil belt ranges from 300 to 800 feet. Ledges of this group are saturated with oil at the Big Horn, Arago and Seminole, and at the Beaver the oil emerges from it. It also surrounds the Salt Creek oil basin, and occurs in massive forms on the flanks of the Powder River petroleum territory.

During the deposition of these Fox Hills rock, the cretaceous areas were narrowing. The borders of its oceans on the east had become dry land, and the era itself was inaugurated by shallow seas, whose bottoms, however, were slowly subsiding, making it possible for such great areas and thicknesses of sandrock to be deposited. The Fox Hills group is the closing member of the cretaceous period. Toward its close the continent was slowly rising. From 5,000 to 5,500 feet of sediments had been deposited. It eventually reached that level when it could have only an imperfect communication with the ocean, and was fed to such an extent with fresh water streams that it became a brackish water sea. This change inaugurated the Laramie group epoch. A few times during the progress of this epoch, the ocean invaded the brackish water seas, peopling them again with marine life. These incursions were geologically of short duration. Brackish waters, and brackish water species, characterized this territory during the greater part of its history. Some geologists, who have principally studied its plant life, consider this group as tertiary, while those who have studied its animal life consider it cretaceous. Now it is generally regarded as a transition member between the cretaceous and tertiary, by most geologists—a lost volume of geological history restored in America.

In the region of, and along the oil belt, the Laramie group is made up of sandstones, clays and shales. Often there are strata above and below the coal beds that are made up of very white and soft sandstones. This is the great coal group of the Rocky Mountains, and reaches its maximum of development in Wyoming. Here the coal beds are colossal in size. In thickness and extent the coal fields are not inferior to those of the appalachian region. The conditions that prevailed in the latter during the carboniferous age existed in the Rocky Mountain region during the progress of the Laramie epoch. It was a time of colossal forests on the uplands, and of vast morasses, in which was accumulated the organic matter that subsequently was transmuted into coal. The coal is called lignite only because in chemical composition it approximates in character to the lignite in Europe, though the coals there are brown, while here they are black and bituminous. Beds of these coals exist from one to seventy feet thick, though their common range is from four to fifteen feet in thickness. From three to eleven coal beds frequently occur together. As already observed it is close to, or within reach of, all the oil basins. The thickness of this group in the vicinity of the oil basins is from 1,500 to 3,000 feet. Elsewhere in this territory it reaches a thickness, according to King, of 5,000 feet.

At the close of the Laramie group epoch occurred one of the greatest revolutions in the history of the globe. The whole series of conformable strata between the beginning of the triassic and the close of the Laramie deposits were thrown into a series of folds, and the whole of the Rocky Mountains was further elevated. The Laramie group beds, and those of the groups beneath it, were turned up at all angles from a few degrees to a vertical position, and faulting occurred on a gigantic scale. A broad depression was left eastward of the Wasatch, and on both sides of the Uintas, into which fresh water streams poured and formed a great fresh water lake that inaugurated the first great epoch of cenozoic times, namely: The tertiary age. In this period of crushing together and folding of strata, a vast amount of heat must have been produced and set free, and this heat may have been concerned in the production of oil by slow distillation.

It does not come within the purpose of this report to pursue the geological history of this region further through the tertiary ages and the quaternary period to our own epoch. The discussion of the fauna and flora of the periods under review had also to be omitted. The purpose simply has been to point out the most important geological events necessary to an understanding of the problems of oil geology in Wyoming.

MINERALS OF WYOMING TERRITORY.

The following list of the minerals of Wyoming are only such as have come under my observation in the field, or have been submitted for determination. It is very far from being complete. It has, however, been thought best to give the list in its yet imperfect form in order to direct attention to this field of investigation; and in order to enlist the services of all who are interested in our resources, and who have the opportunity and inclination, to aid in making such collections. It is hoped that a few years of additional work in this field will enable someone to prepare a complete list and description of all our principal mineral forms. If the inquiries continually made at the office of the Territorial Geologist are a criterion, such a work is very much needed.

PRELIMINARY LIST OF THE MINERALS OF WYOMING.

ORES OF GOLD.

Gold occurs in gravel and alluvium along many of the streams. The oldest of the placer workings are on the Strawberry and upper Sweetwater and its tributaries. In veins, it occurs in the Wind River Mountains; the Seminoe and Black Hills, west of Cheyenne; also in the Big Horn Mountains, Douglass district, and numerous other localities. Gold occurs only native, unless tellurides be an exception, concerning which it is not yet agreed whether the combination is chemical or mechanical. The gold-bearing ores of Wyoming are

Calaverite, Sylvanite and Petzite. The first detected in minute points in Deserted Treasure mine, Seminoe Mountain. The two latter in minute quantities in the western part of the Silver Crown district. They have not yet been found anywhere in sufficient quantity to be of value.

Chalcopyrite—Copper Pyrites; *Barnite*—Variegated Copper Pyrites. See copper ores.

Iron Pyrites. See iron ores.

These minerals constitute gold ores where they occur in quartz leads. Sometimes the copper and sometimes the iron pyrites are the richer in gold.

ORES OF SILVER.

Native Silver. Found at Running Water mine, North Park, but rarely elsewhere.

Argentite. Silver Glance. Sulphuret of Silver. North Park. Ferris Mountain in minute quantities.

Freibergite. Tetrahedrite. Argentiferous Gray Copper.—King David mine, in Silver Crown. Some doubt expressed whether an ore here containing antimony and sulphur is combined chemically or mechanically with the copper. In the latter case it would not be tetrahedrite.

Chalcocite. Copper Glance. Redruthite—King David mine, Fairview mine and other mines in Silver Crown. This ore of copper in this district carries more or less silver.

PALLADIUM.

Detected in ores from Silver Crown in combination with silver and gold.

MERCURY

Occurs as native in the sands of the Big Horn River.

Cinnabar. Mercury Sulphide.—Detected in minute quantities in some of the black ores from western part of Silver Crown district.

COPPER.

Found native near Granite Canyon, Sherman and the region north and south of the above; also on Douglass creek.

Chalcocite. Copper Glance. Redruthite. Covellite. or Blue Copper.—King David mine, in Silver Crown district. Silver Crown district. East Seminoe Mountain.

Chalcopyrite.—Copper Pyrites. Copper and Iron Sulphide.—Metcalf mine, Copper King (Professor Stanton's). Copper King (Mr. Adam's), King David mine, Fairview, etc., in Silver Crown district, East Seminoe Mountain, in Copperhead, Blacksnake, Viper and Rattlesnake mines on upper Platte, south of Fort Steele. Generally carries silver and gold.

Barnite. Erubescite. Variegated Copper Pyrites.—King David mine, Silver Crown, Blacksnake and Viper mines.

Tetrahedrite.—Gray Copper. Fahlerz—See under silver ores.

Cuprite.—Red Copper Ore.—Often mistaken for native copper; Copper King mine (Mr. Adam's), King David, in Silver Crown, Hartville.

Tenorite. Melaconite, or Black Copper. Copper Oxide.—Occurs sparingly at surface in some of the copper mines in Silver Crown; also, on upper Platte, south of Fort Steele. At Hartville.

Cyanotrichite. Velvet Copper Ore,related to copper sulphate.—Occurs among Potsdam sandstones north and north-west of Rawlins.

Olivenite. Hydrous Copper Arsenate.—In Potsdam sandstone north-west of Rawlins.

Malachite—Green Copper Carbonate.—Common at the surface of lodes in Silver Crown, massive at Hartville, East Seminoe Mountain, on upper North Platte, Big Horn Mountains.

Azurite.—Blue Copper Carbonate.—Occurs, but not so abundantly, with the preceeding.

Aurichalcite, or Hydrous Copper and Zinc Carbonate.—Lenox mine, Silver Crown.

LEAD.

Galenite. Galena. Lead Sulphide.—Silver Crown district, Ferris Mountain, Seminoe Mountain, etc.

Clausthalite, or Lead Selenide—Carbonate Belle, Grant, Pacific and other lodes; sparingly in Silver Crown.

Nagyagite, or Foliated Tellurium.—In minute quantities and rarely in Carbonate Belle, Silver Crown.

Minium—Oxide of Lead—In minute quantities in Lenox mine, Silver Crown.

Wulfenite.—Lead Molybdate.—In fine crystals in Lenox mine, Silver Crown.

Cerussite.—White Lead Ore, Lead Carbonate.—Lenox mine, Carbonate Belle, etc., Silver Crown, on Ferris Mountain.

The lead ores of Silver Crown carry more or less silver; as also those on Ferris Mountain.

ZINC.

Thus far zinc has been found only in minute quantities.

Sphalerite.—*Blende.*—Zinc Sulphide.—In minute quantities on Seminoe Mountain; also on Ferris Mountain.

Zincite.—Red Zinc Ore. Red Zinc Oxide.—North park in minute quantities.

CADMIUM.

Detected in minute quantities in the analyses of some black ores in western part of Silver Crown.

TIN.

Cassiterite.—Tin Oxide.—In northeastern Wyoming, near Rawhide Buttes, in minute quantities; also in small quantities in Silver Crown district.

TITANIUM.

Rutile.—Oxide of Titanium.—Rare in Wyoming. One specimen on east end of Seminoe Mountain, near the Platte.

COBALT. NICKEL.

Linnæite.—Cobalt Sulphide.—With other ores and detected by analysis from Silver Crown, west of Laramie.

Millerite.—Nickel Sulphide.—In Matilda Jane mine on Ferris Mountain. Contains there two per cent of nickel.

Erythrite.—Cobalt Bloom.—On Middle Crow Creek, Silver Crown district.

URANIUM.

Uraninite—Uranium Oxide—In Carbonate Belle, Thunder Cloud, Hermosetta, Grant, Pacific and other claims in Silver Crown district.

Torbernite.—Uranite, Uran-Mica, a Uranium-Copper Phosphate.—Same localities as the preceeding.

Autunite.—A Uranium-Calcium Phosphate.—Same localities as the preceeding.

IRON.

Pyrite.—Iron Bisulphide.—Common in most of the gold mines. Generally gold bearing.

Pyrrhotite.—Iron Sulphide.—Douglass district, but rare. Cummins City.

Arsenopyrite.—Mispeckel. Arsenical Iron Pyrites.—Rare. East end of Seminoe Mountain.

Hematite.—Specular Iron Ore.

VARIETIES.

Specular Iron.—Common. Rattlesnake, Seminoe, Ferris, Big Horn and Medicine Bow Mountains, etc.

Micaceous Iron.—Rattlesnake,Seminoe,Ferris and Wind River Mountains.

Red Hematite,—Near Rawlins, Seminoe Mountain, south of Bradley's peak in prodigious masses. In Shirley Basin, etc.

Jaspery Clay Iron.—Seminoe Mountain,Ragged Range, etc.

Senticular Argillaceous Ore.—Seminoe Mountain.

Itabyrite.—South of Bradley's peak.

Menaccanite. Titanic Iron.—On Chugwater in immense beds.

Magnetite—Magnetic Iron Ore—South of Bradley's peak along with hematite. Shirley Basin.

Arseniosiderite.?—An arsenate of iron occurring in Silver Crown is provisionally referred to this species.

Siderite.—Spathic Iron. Iron Carbonate.—Occurs in Laramie beds with and in proximity to coal beds. Large quantities in Fort Benton group of the cretaceous. Forms beds of rounded and kidney-shaped boulders on South Powder, and on Salt Creek.

MANGANESE ORES.

PYROLUSITE.

Manganese Dioxide.—Common in Silver Crown district.

PSILOMELANE.

Hydrated Manganese Dioxide with Baryta or Potassa.—Carbonate Belle, Thunder Cloud, Pacific and other lodes in Silver Crown district.

WAD.

Bog Manganese.—In dendritic delineations. In mines on Seminoe Mountain, Ferris Mountain, Wind River Mountain.

TRIPHYLITE.

Carbonate Belle and Pacific lodes, Silver Crown district.

ALUMINUM.—CORUNDUM.

Rare. One specimen from East Seminoe, near the Platte. Ragged Range, Wind River Mountains.

RUBY.

Extremely rare. One specimen from limestone on southeast Seminoe Mountain.

SPINEL.

Rare. Southeast Seminoe in limestone.

ALUNOGEN.

Hydrous Aluminum Sulphate.—On Bitter Creek, but rare. The specimens among the finest in existence.

MAGNESIUM.—BRUCITE.

Magnesian Hydrate.—North of the west end of Rattlesnake Mountain.

EPSOMITE.

Epsom Salt. Magnesium Sulphate.—Occurs in the waters of Salt Creek, in some soda lakes along the Sweetwater, in a cave on south side of Seminoe Mountain.

MAGNESITE.

Magnesium Carbonate.—Silver Crown, Wind River Mountains, Medicine Bow Mountains.

CALCIUM.—FLUORITE.

Fluor Spar.—In limestone south of Seminoe and north of the Rattlesnake Mountains. In limestone in Little Popoiagie canyon.

GYPSUM.

Hydrous Calcium Sulphate.—Occurs in beds from forty to sixty feet thick in the jura trias beds on the Little Popoiagie, and in many other localities in rocks of this age. Common in the Fort Benton group.

Selenite.—Also common in the Fort Benton group of the cretaceous.

Satin Spar.—Occasional in the jura trias beds and in the Fort Benton cretaceous.

Alabaster.—In the jura trias on the Popoiagie, intercalated with gypsum.

ANHYDRITE.

Anhydrous Calcium Sulphate.—Occasional in the rock masses of the Dakota group of the cretaceous as at Seminoe Mountain. Also in the jura trias as on the Popoiagie and Little Wind River.

APATITE.

Calcium Phosphate.—Have not seen it in place. Specimens submitted to me said to have been obtained in the Big Horn Mountains.

CALCITE.

Calc Spar. Calcium Carbonate.—Occurs sparingly, but widely diffused in the cretaceous and tertiary rocks and occasionally in mines.,

Iceland Spar.—Transparent Crystalline Calcite.—In Platte canyon east of Seminoe Mountain. In canyons of the Popoiagie in paleozoic limestone and many other localities.

Calcareous Tufa.—On head waters of South Powder, on head of Salt Creek, on Medicine Bow, on head of west Horse creek, etc.

Stalactite. Stalagmite.—Common in caverns in the jura trias rocks, in limestone cavern on East Seminoe, in caverns in Popoiagie canyons.

Compact Limestone.—Common. Finest found in the jurassic, carboniferous and silurian beds.

Granular Limestone.—Marble.—North of the Rattlesnake Mountains in Quebec group of the silurian. In Wind River and Big Horn Mountains.

Anthraconite.—Stinkstone.—In silurian beds in Little Popoiagie canyon.

Lithographic Stone.—North side of Wind River Mountains. Obtained by Captain Nickerson.

ARAGONITE.

West of Laramie City. On Rock Springs. In the jurassic beds along Rattlesnake Mountains and on the Little Popoiagie.

DOLOMITE.

Magnesium Carbonate of Lime.—In permian beds north of Wind River Mountains; at head of Twin Creek.

BARIUM.—BARITE.

Barium Sulphate.—Rare. One specimen from King David mine, Silver Crown district. Lost Cabin mines.

STRONTIUM.—CELESTITE.

Strontium Sulphate.—In geodes in triassic beds on north side of Rattlesnake Mountain, on head of Rogers creek. Rare.

STRONTIANITE.

Strontium Carbonate.—In same locality as the celestite.

SODIUM.—HALITE.

Sodium Chloride.—Common Salt.—Salt Spring creek, tributary of South Powder. Also Salt creek, another tributary of the Powder. Many other localities.

MIRABILITE.—GLAUBER SALT.

Hydrous Sodium Sulphate.—More abundant than elsewhere in America. In lakes near Laramie, in comparatively large lakes on the Sweetwater, where it exists from one to forty feet thick; also a few on the Platte. In solution in Salt creek.

BORAX.

Hydrous Sodium Biborate.—Only as yet found in traces in a few soda lakes.

NATRON.

Carbonate of Soda.—Occurs more sparingly in small lakes along with the sulphate of soda.

NITRATINE.

Sodium Nitrate.—Occurs in traces on Bitter Creek.

SILICA AND SILICATES.

SILICA.—QUARTZ.

I. VITREOUS VARIETIES.

Rock Crystal.—Pure Pellucid Quartz.—Common.

Amethyst.—Rare. East Seminoe Mountain. Owl Creek Range.

Rose Quartz.—Common in Sweetwater Range. Fine specimens near Lankin's ranch.

False Topaz.—Rare. A few crystals found on Medicine Bow and on Sweetwater Range.

Smoky Quartz.—Sierra Madra and in Douglass district.

Milky Quartz.—Common.

Prase.—Common along the Rattlesnake Range.

Aventurine Quartz.—Common in many places among the archæan rocks.

Ferruginous Quartz.—Common.

II. CHALCEDONIC VARIETIES.

Chalcedony.—Common, especially in many places along the Sweetwater and its tributaries.

Chrysoprase.—Rare. Occurs north of the Poison Spider and on south side of the Sand Creek tributary of the Beaver, and on the Little Wind River.

Carnelian.—Around Table Mountain in Silver Crown district. On the Beaver and many other localities.

Sard.—Table land south of Sand Creek tributary of the Beaver. Between Poison Spider and South Casper Creeks.

Agate.—Widely diffused. The variety *Moss Agate* (*Mocha Stone*), once extremely abundant, especially along portions of the Sweetwater. Agate Lakes, west of Lankin's ranch on the Sage Hen, a famous locality. *Fortification Agate.*—Abundant in Bad Lands on Ham's Fork of the Green River and many other localities.

Onyx.—Common in Bad Lands south of Sand Creek, tributary to the Beaver.

Sardonyx.—Rare, but found in same locality as the above. Also between Poison Spider and Casper Creeks.

Flint. Harnstone.—Occur occasionally over the greater part of the territory.

Chert.—In limestone in Silver Crown district. Also occasionally in limestone of jurassic age. On north side of the Rattlesnake.

The chalcedonic varieties of quartz are most abundant where strata of tertiary age occur in a decomposed state. They occur more or less abundantly through the tertiary Bad Land areas.

III. JASPERY VARIETIES.

Jasper.—Fine specimens around Table Mountain, in Silver Crown district. Common where triassic rocks are decomposed. Abundant along north side of the Rattlesnake range.

Riband Jasper and Egyptian Jasper.—Are occasionally found in the same localities as the above.

Fortification Jasper.—Around Table Mountain, in Silver Crown district, in the form of nodules.

Bloodstone.—Heliotrope.—North of Rattlesnake Mountain in triassic rocks, but with the green and red colors in large blotches.

Lydian Stone.—Touchstone.—North of the Rattlesnake Mountain.

Tabular Quartz.—*Granular Quartz.*—These varieties frequently encountered in the archæan districts.

Silicified Wood.—Common. Occasionally agatized. Magnificent specimens on Ham's Fork of the Green.

OPAL.

Fire Opal.—Rare. On north side of Sweetwater, near Lankin's ranch. In Ragged Range.

Common Opal.—Occasional along the Sweetwater, on Sage Hen and at Agate Lakes.

Wood Opal.—Occasionally found in same localities with petrified wood.

Siliceous Sinter.—Common in the Yellowstone park and in a few localities elsewhere.

SILICATES.—I. BISILICATES.

Wollastonite.—Tabular Spar.—In granular limestone north of Rattlesnake Mountains.

Pyroxene.—Augite.—All three varieties occur on Seminoe Mountain, at and around Young's and Bradley's Peaks.

Malacolite.—White Augite.—On north side of Mill Creek. Seminoe Mountain. Also on south side of Bradley's Peak.

Augite.—Same localities as the above.

Diallage.—On east Seminoe, but rare.

RHODONITE.

Manganese Spar.—In Ragged Range, but rare.

AMPHIBOLE.

The following varieties have been observed:

Actinolite.—Seminoe Range. Ragged Range. Sweetwater Mountains.

Asbestus.—Occurs in large quantities about eleven miles northeast from Bradley's Peak, and at a few other points in the Seminoe Range.

Hornblende.—Common. Fine terminations at and around Cummins City.

BERYL.

In Black Hills in northeastern Wyoming.

Aquamarine.—This variety of beryl rare. A few specimens from southeastern Seminoe Range.

UNISILICATES.—CHRYSOLITE.

Olivine.—In Shoshone Range. Wind River Mountains, near Union Pass. In Sierra Madre, south from Rawlins.

GARNET.

From near Union Pass, Wind River Mountains. On East Seminoe. In sands in the North Fork of Clark's Fork.

ZIRCON.

The single specimen submitted to me was said to have been obtained in Big Horn canyon.

EPIDOTE.

Fine crystals at Devil's Gate, on the Sweetwater. On Seminoe and Ferris Mountains. On Medicine Bow Mountains. Black Hills.

BIOTITE.

Silver Crown. Rattlesnake Mountains. Douglass district. Wind River and Shoshone Mountains.

MUSCOVITE.

Common Mica.—Common in small scales in regions of archæan rocks.

ASTROPHYLLITE.

Bronze Mica.—Found occasionally in the sands of the upper Chugwater.

ANORTHITE.

Lime Feldspar.—Occasional on Seminoe Mountain, in connection with pyroxene rocks.

LABRADORITE.

Lime. Soda. Feldspar.—Common where eruptive rocks occur.

ANDESITE.

Rare. Occasional in the Seminoe Range.

OLIGOCLASE.

Soda. Lime. Feldspar.—Common in granite, syenite and other metamorphic rocks.

ALBITE.

Soda. Feldspar.—Near Dome Rock and at other points along the Sweetwater Range.

MICROLINE.

Potash. Feldspar.—Rather common in the Laramie Mountains.

ORTHOCLASE.

Common Feldspar.—Common in areas of archæan rocks. Some fine crystals in Silver Crown district.

Sanidin, or Glassy Feldspar.—Found in microscopic masses in Copper King mine.

SUBSICICATES.—TOURMALINE.

South from Granite Canyon. Cummins City. Wind River. Sierra Madre and Medicine Bow Ranges.

TOPAZ.

Rare. In Ragged Range on the head of Camp Creek.

TITANITE.

Sphene.—Rare. In Laramie Mountains at the head of the Chugwater.

HYDROUS SILICATES.—TALC.

Common. Fine specimens on Seminoe Mountain.

Foliated Talc.—At Deserted Treasure mine, Seminoe Mountain.

Soapstone.—North side of Rattlesnake Mountains, on head waters of South Powder.

Indurated Talc.—Near Bradley's Peak.

PYROPHYLLITE.

Specimens of this brought to me and said to have been obtained on East Seminoe. Have not seen it in place.

GLAUCONITE.

Green Earth.—Common in the tertiary beds of the Bad Lands along Dry Sand Creek, east of the Beaver tributary of the Wind River. Exists there in thick beds towards the sources of this bed.

SERPENTINE.

Silver Crown. Laramie, Seminoe, Ferris and Wind River Ranges. Shoshone Mountains.

SAPONITE.

Laramie Plains. Presented by Col. S. W. Downey.

KAOLINITE.

Only in minute quantities in places along the Sweetwater Range. Wind River Mountains, south of Lander. Silver Crown district. Ordinary clays common.

DAMOURITE.

From west end of Rattlesnake Range. Rare.

HYDRO-CARBON COMPOUNDS.

MARSH GAS.

Light Carburated Hydrogen—Popoiagie, Wind River and in places along other rivers in Wyoming.

PETROLEUM.

Extremely abundant in places. See special report.

AMBER.

Small masses from the size of a pin head to that of a buckshot in the coal beds of the Laramie group, north of the Rattlesnake Mountains. Less compact and more brittle than the amber of commerce, but resists solvents like them.

ASPHALTUM.

The hardened oil at the surface in the petroleum basins on the Popoiagie, Beaver, Rattlesnake, etc., comes close in constitution to the asphalt of commerce, and is provisionally classed with them.

MINERAL COAL.

One fifth of the territory is underlaid by the coal of the Laramie group—the transition group between the cretaceous and tertiary. It has been classed with the lignite coals because of the amount of water in mechanical and chemical union with the carbon. It is, however, essentially bituminous, and some of the coals approximate in physical structure to the black coals. No good coking coals have yet been discovered. Many of them are exceptionally fine domestic fuels.